



HITACHI

SERVICE MANUAL

TK

No. 1884E

VK-C830E

Technical Data



SAFETY PRECAUTIONS

The following precautions should be observed when servicing.

1. Since many parts in the unit have special safety-related characteristics, always use genuine Hitachi replacement parts. Especially critical parts in the power circuit block should not be replaced with other makes. Critical parts are marked with ⚠ in the schematic diagram, and circuit board diagram.
2. Before returning a repaired unit to the customer, the service technician must thoroughly test the unit to ascertain that it is completely safe to operate without danger of electrical shock.

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

COLOR VIDEO CAMERA

April 1983

TOKAI WORKS

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SPECIFICATIONS

System:	Uni-frequency separation system
Signal type:	Based on PAL system
Camera tube:	1/2" SATICON
Synchronization system:	Internal synchronization
Horizontal rezolution:	Better than 250 TV line
Video output:	1 Vp-p 75Ω (Unbalanced)
Video S/N ratio:	45 dB or more
Standard object luminance:	500 lux
Minimum luminance required:	60 lux
Built-in microphone:	Uni-directivity electret condenser microphone
External mic input:	—65 dB, high impedance
Audio line output:	—20 dB, low impedance
Lens (accessory):	F1.6, f = 8.5 — 68 mm zoom (x 8)
Lens mount:	Special mount (with auto iris power zoom, macro mechanism)
Dia. of filter screw:	52 mm, thread pitch 0.75 mm
Viewfinder:	Electronic viewfinder system
	Cathode ray tube: 1" cathode ray tube
	Display function: Recording, quantity of light, battery, white balance
Color temperature control:	From tungsten bulb illumination to cloudy weather
Automatic sensitivity control range:	60 — 100,000 lux
Power voltage:	DC 12V
Power consumption:	6.0W
Dimensions:	3-1/8"(W) x 8-5/8"(H) x 13-9/16"(D) (80 x 219 x 345 mm)
Weight:	3.5 lbs. (1.6 kg)
Accessory:	Grip 1
10 Pin connector:	1. Video In/Out 6. Pause 2. Ground for 1 7. Audio Out 3. Video In/Instant review 8. Ground for 7 4. High/Low* 9. Ground 5. Stand-by/Audio In 10. + B/12V
	* • Low for REC & REC PAUSE Mode • High for other Modes

KEY TO ILLUSTRATIONS

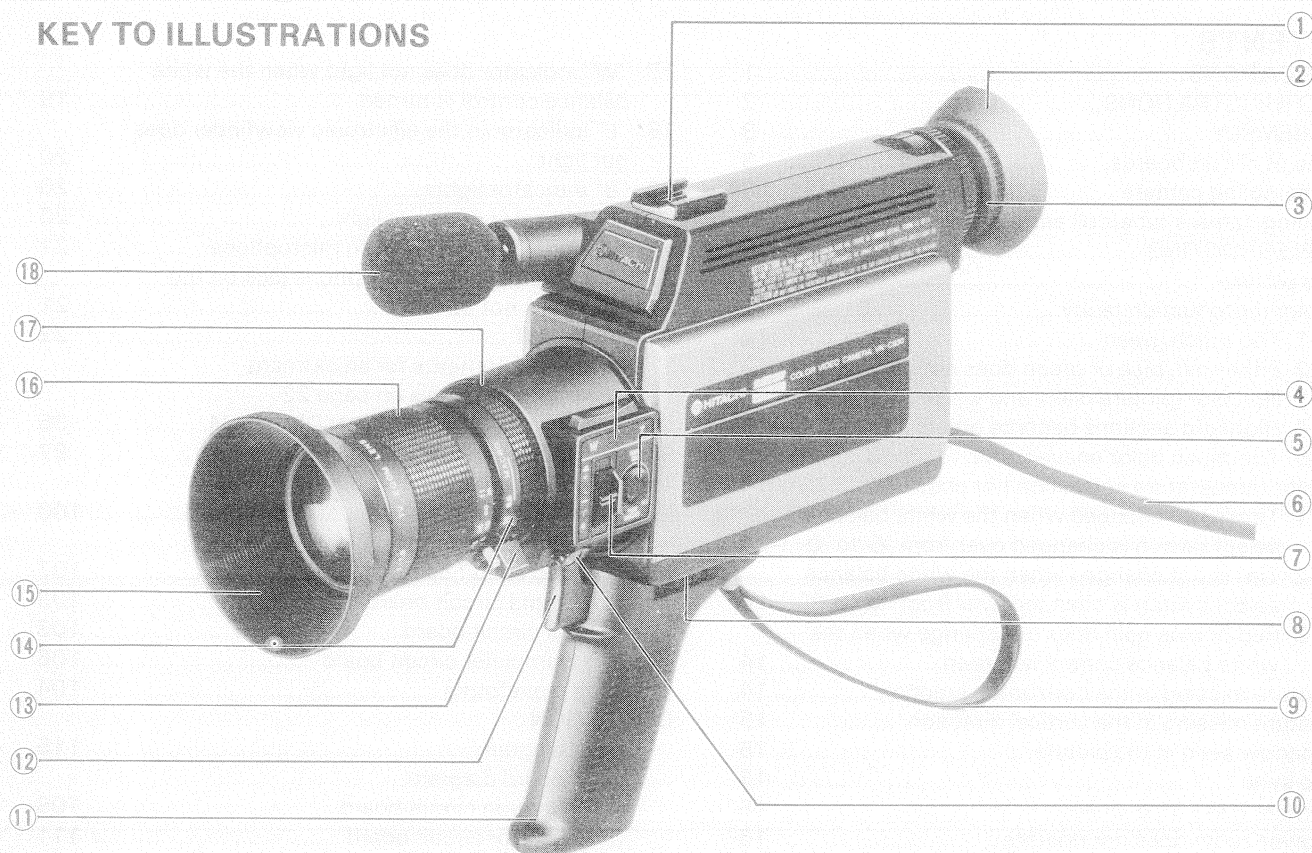


Fig. 1

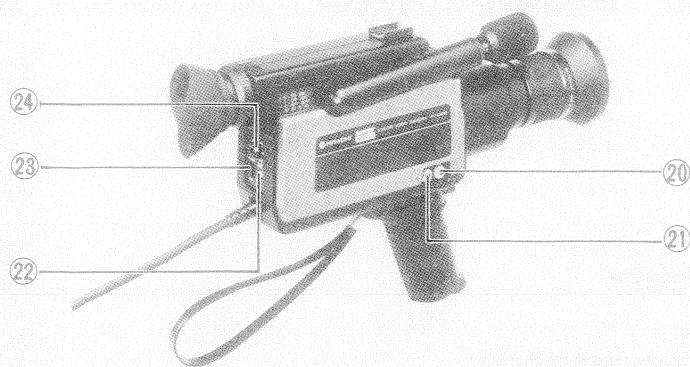


Fig. 2

1. Adaptor shoe
2. Eye-cup
3. Eye-cup fixing ring
4. Power zoom switch
5. White balance control knob
6. Camera cable
7. White balance select knob
8. Hand grip fixing screw
9. Wrist strap
10. Zoom select knob
11. Hand grip
12. Remote control switch
13. Zoom lever
14. MACRO select button
15. Lens hood
16. Focus control ring
17. Zoom ring
18. Boom microphone

20. External microphone jack
21. Earphone jack
22. Record check switch
23. Power save switch
24. Iris control knob

DISASSEMBLY

Names of circuit boards

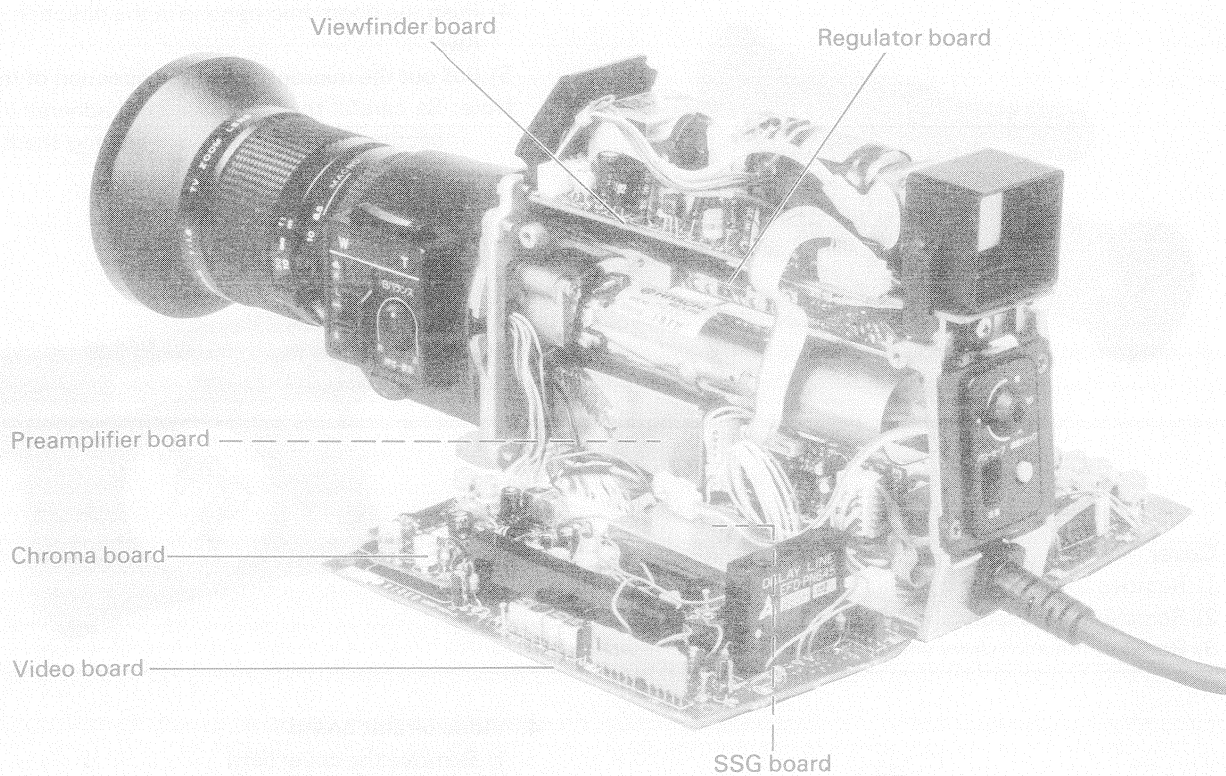


Fig. 3

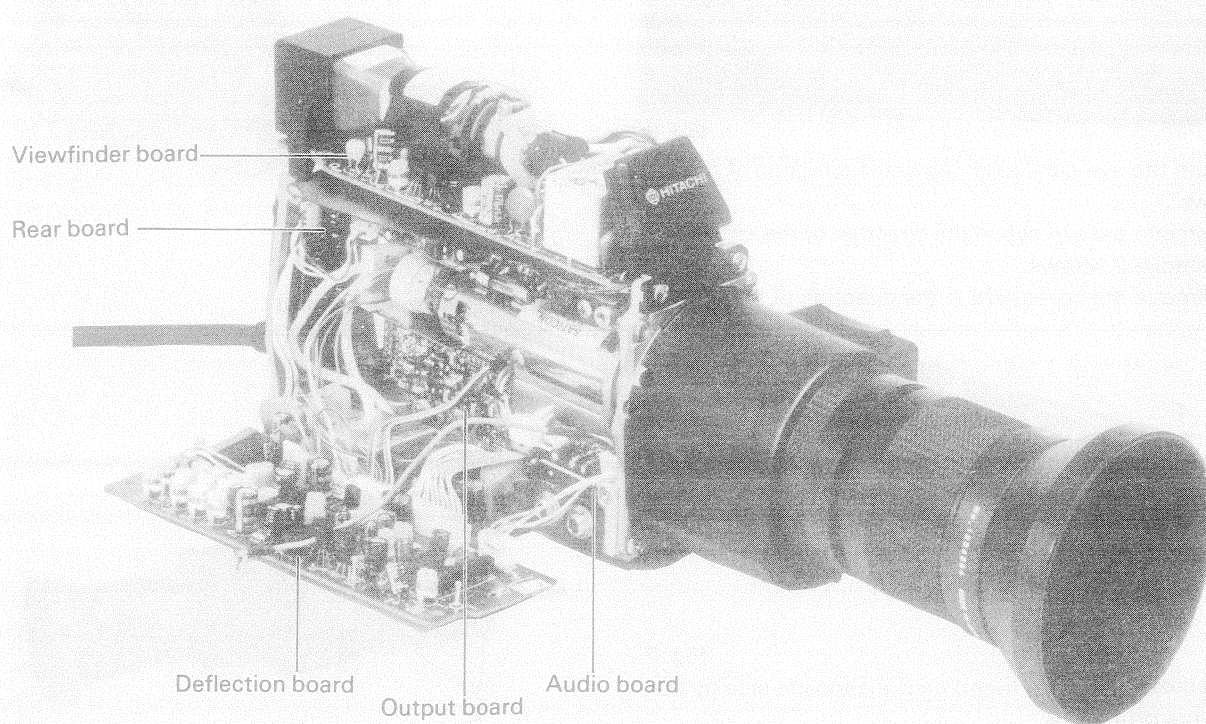


Fig. 4

Disassembling camera

1. Handgrip

- 1) Turn the handgrip in the direction of the arrow.

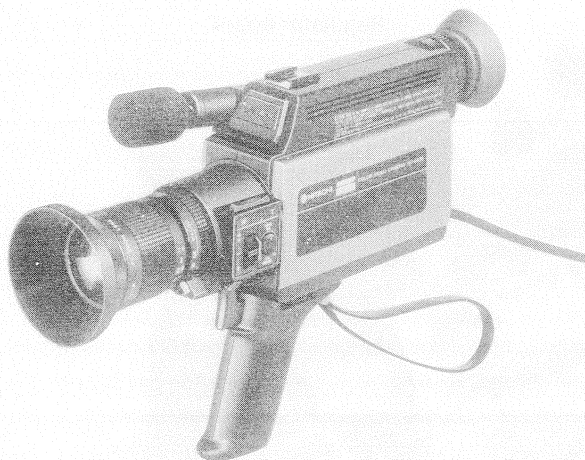


Fig. 5

2. Cover

- 1) Remove the shoe spring.
- 2) Remove 2 accessory shoe screws.
- 3) Remove the accessory shoe.

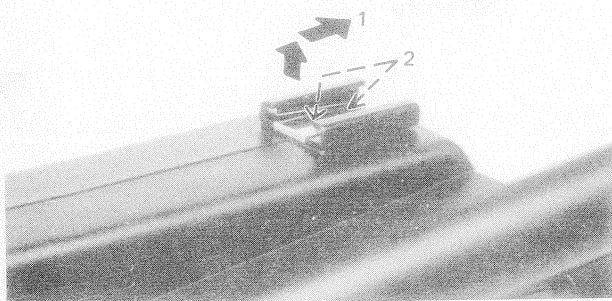


Fig. 6

- 4) Turn the eye-cup fixing ring in the direction of the arrow.
- 5) Remove the eye-cup in the direction of the arrow.
- 6) Remove 2 screws.
- 7) Remove the cover (left) in the direction of the arrow.

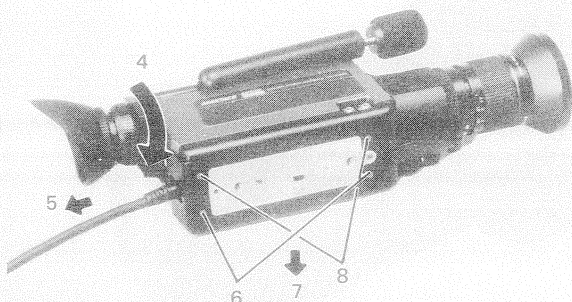


Fig. 7

Remove the cover (right) on the opposite side by the same procedure.

- 8) Remove the cover (right) fixing screw. Remove the connector from the boom microphone when removing the cover (right).

3. Boom microphone

- 1) Remove the cover (right).
- 2) Remove the connector from the boom microphone.
- 3) Remove the screw.
- 4) Push the boom microphone in the direction of the arrow.
- 5) Pull out the microphone in the direction of the arrow.

Note: Be careful that adhesive tape adheres inside the section marked *, when removing the boom microphone.

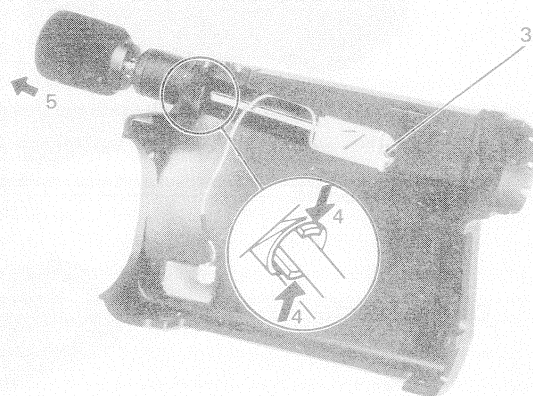


Fig. 8

4. Video circuit board

- 1) Remove the cover (left).
- 2) Remove 2 screws.

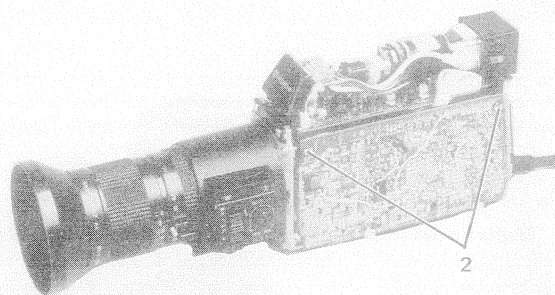


Fig. 9

5. Deflection circuit board

- 1) Remove the cover (right).
- 2) Remove 2 screws.

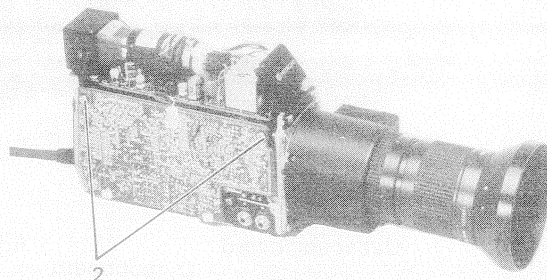


Fig. 10

6. Audio circuit board

- 1) Remove the cover (right)
- 2) Open the deflection board.
- 3) Remove the screw.

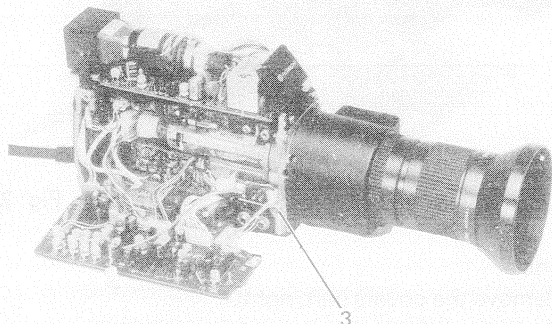


Fig. 11

7. Output circuit board

- 1) Remove the cover (right)
- 2) Open the deflection board.
- 3) Remove 2 screws.

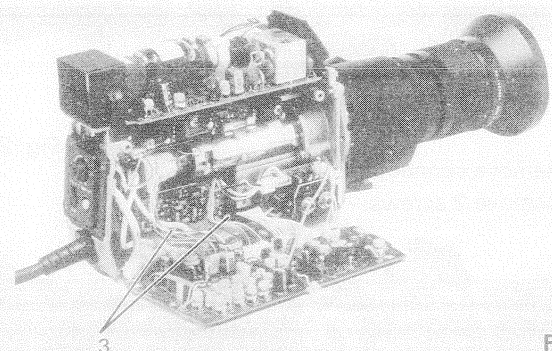


Fig. 12

8. Regulator circuit board

- 1) Remove the cover (right).
- 2) Open the deflection board.
- 3) Remove 2 screws.

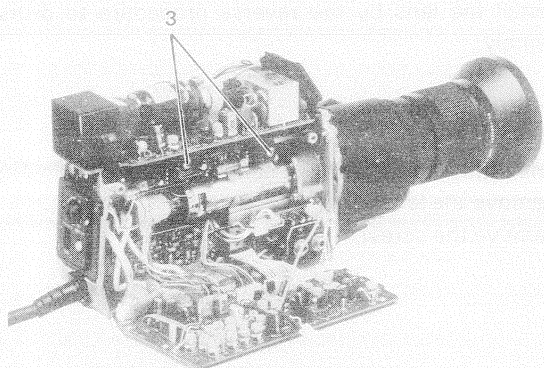


Fig. 13

9. Chroma circuit board

The chroma board is soldered on the video board. Parts supply is together with the video circuit board assembly.

- 1) Remove the cover (right).
- 2) Open the video board.
- 3) Unsolder the chroma board.

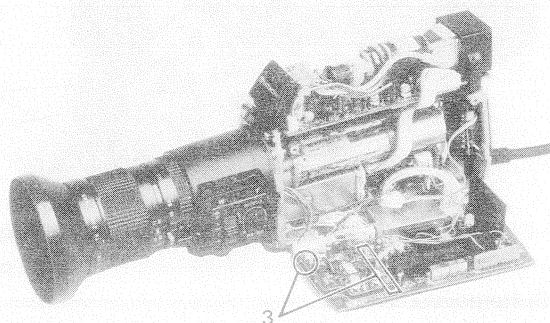


Fig. 14

10. SSG circuit board

The SSG board is soldered to the video board. Parts supply is together with the video circuit board assembly.

- 1) Remove the cover (left).
- 2) Open the video board.
- 3) Remove the shield cover.

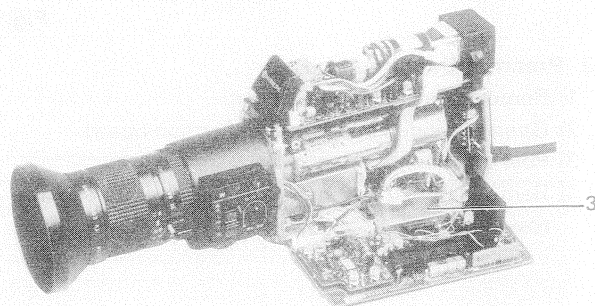


Fig. 15

- 4) Unsolder the SSG board.

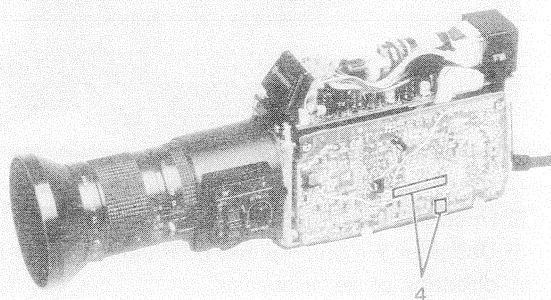


Fig. 16

11. Rear circuit board

- 1) Remove the covers (left, right).
- 2) Open the video board and deflection board.
- 3) Remove the iris control fixing screw.
- 4) Remove 2 screws.

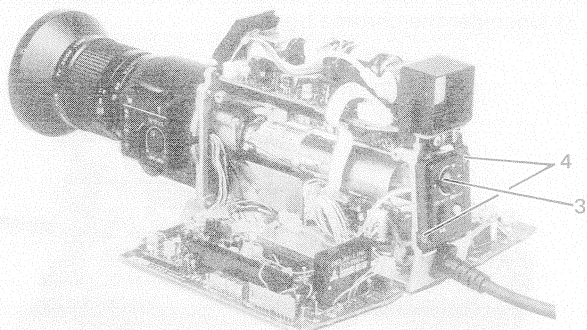


Fig. 17

- 5) Remove 2 screws.

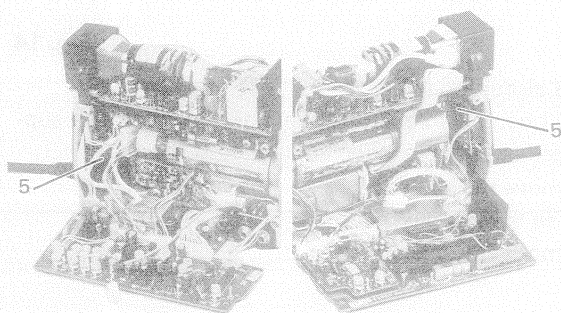


Fig. 18

12. Preamplifier circuit board

- 1) Remove the covers (left, right).
- 2) Open the video board and deflection board.
- 3) Peel off the metal tape.
- 4) Remove the shield cover in the direction of the arrow.

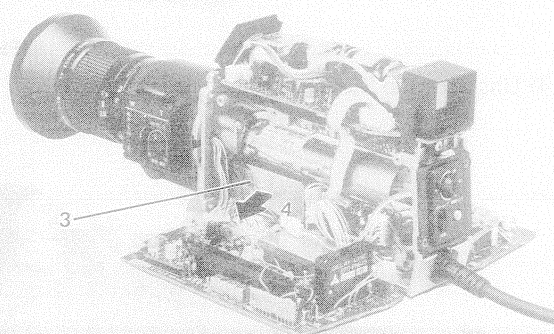


Fig. 19

- 5) Unsolder the target lead.
- 6) Unsolder the preamplifier board and remove it in the direction of the arrow.

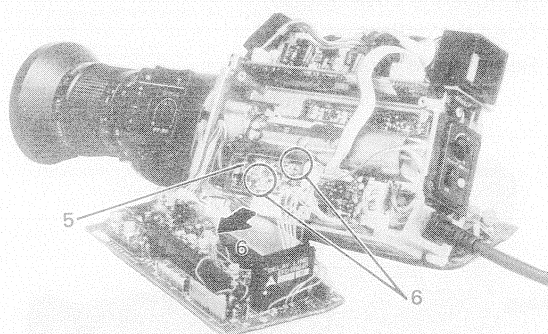


Fig. 20

13. Lens

- 1) Remove the covers (left, right).
- 2) Open the video board and deflection board.
- 3) Remove 4 screws.

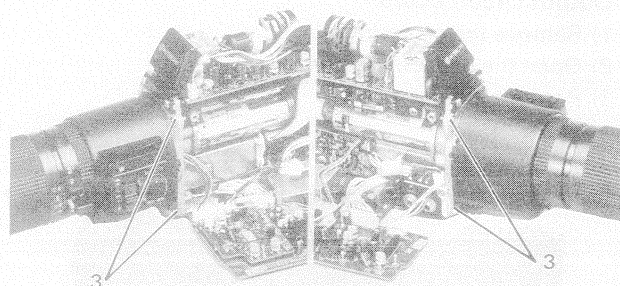


Fig. 21

- 4) Remove connectors CN102 and CN205.
- 5) Remove 2 screws.

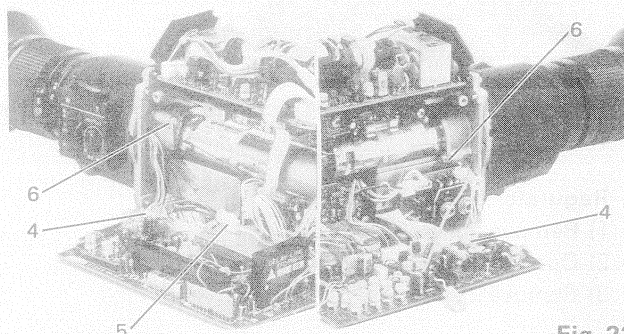


Fig. 22

* Install the lens by the reverse procedure to disassembly.

14. Remote circuit board

- 1) Remove the covers (left, right).
- 2) Open the video board and deflection board.
- 3) Remove the lens.
- 4) Remove the screw.

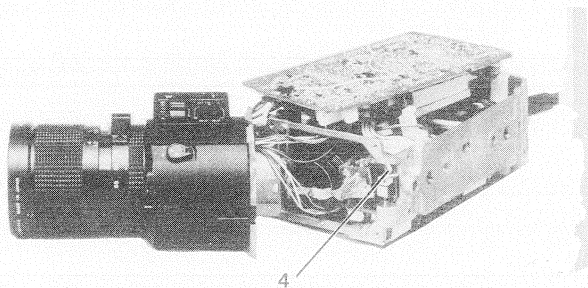


Fig. 23

15. Viewfinder circuit board

- 1) Remove the covers (left, right).
- 2) Remove connector P501.
- 3) Remove the screw and then remove the viewfinder board in the direction of the arrow.

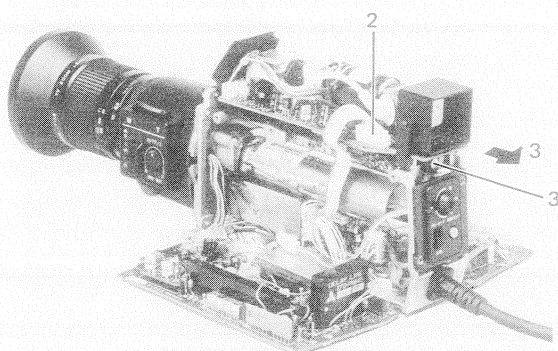


Fig. 24

16. Viewfinder CRT

- 1) Remove the covers (left, right).
- 2) Remove the viewfinder board.
- 3) Remove the socket, clip and holder.

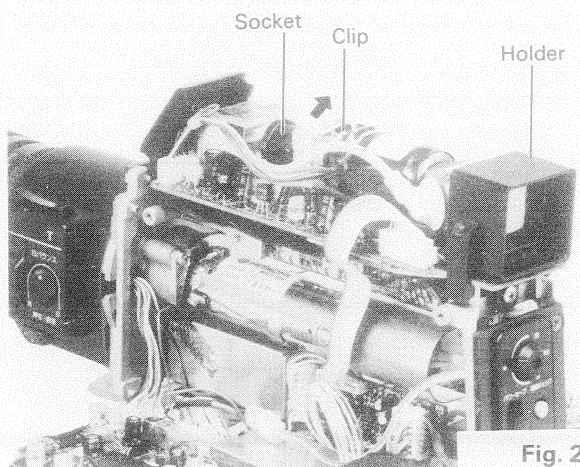


Fig. 25

Replacing camera tube/coil ass'y

Turn off the power before replacing this.

- 1) Remove covers (left, right).
- 2) Open the video board and deflection board.
- 3) Remove the lens.
- 4) Remove connectors CN101, CN105 and CN202.
- 5) Unsolder the socket to remove it.
- 6) Remove the preamplifier board.

Now, the camera tube/coil ass'y can be removed with the shield case attached.

New assemblies are supplied in this state.

- 7) Unsolder 4 points to remove the shield case.

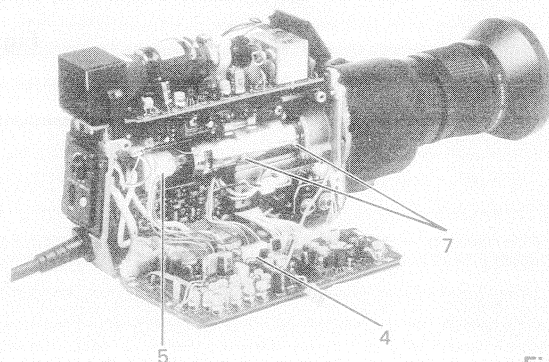


Fig. 26

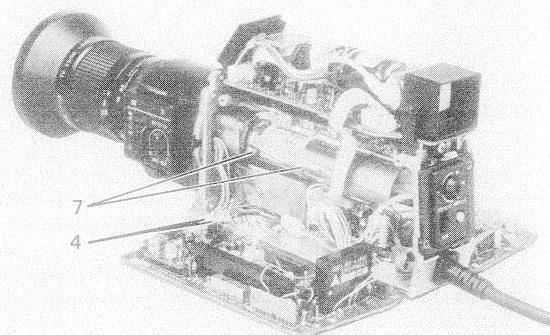


Fig. 27

- 8) Install in the reverse, order to disassembly.
- 9) Perform adjustment after replacing the camera tube/coil ass'y.

Note: 1. Use gloves when replacing the camera tube/coil ass'y so that fingerprints and dust do not adhere to the surface or walls of the camera tube.

Fingerprints and dust have a bad effect on the picture. Wipe off using chamois leather or lens cleaning paper when any dirt adheres.

2. Azimuth adjustment between the tube and deflection coil and alignment adjustment have been performed in the factory before shipment, so do not loosen the tube fixing screw or internal tube clamp screw and do not turn the alignment magnets.

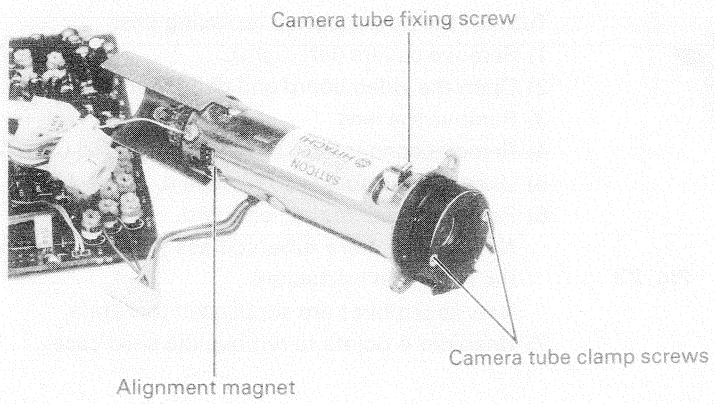


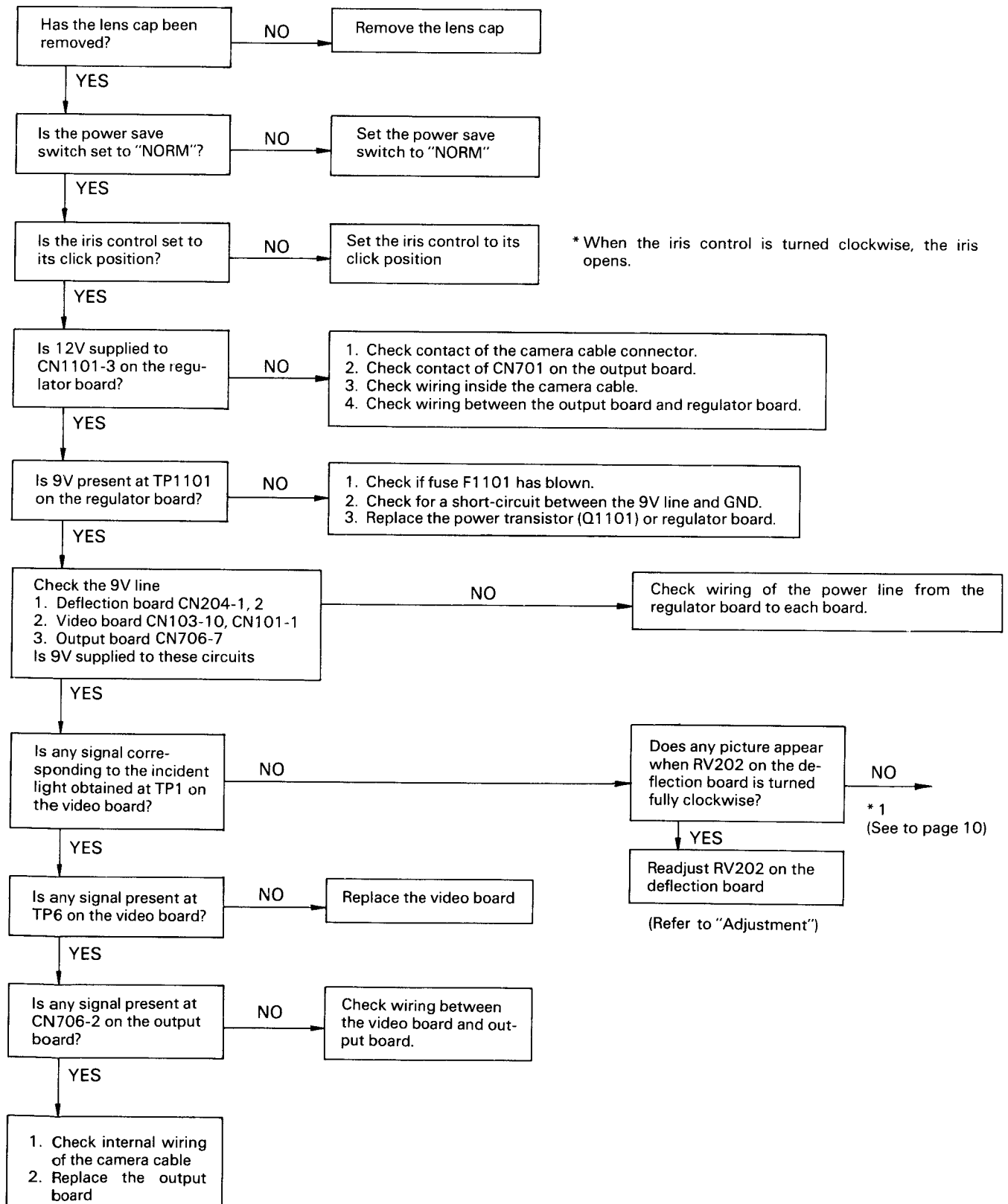
Fig. 28

TROUBLESHOOTING

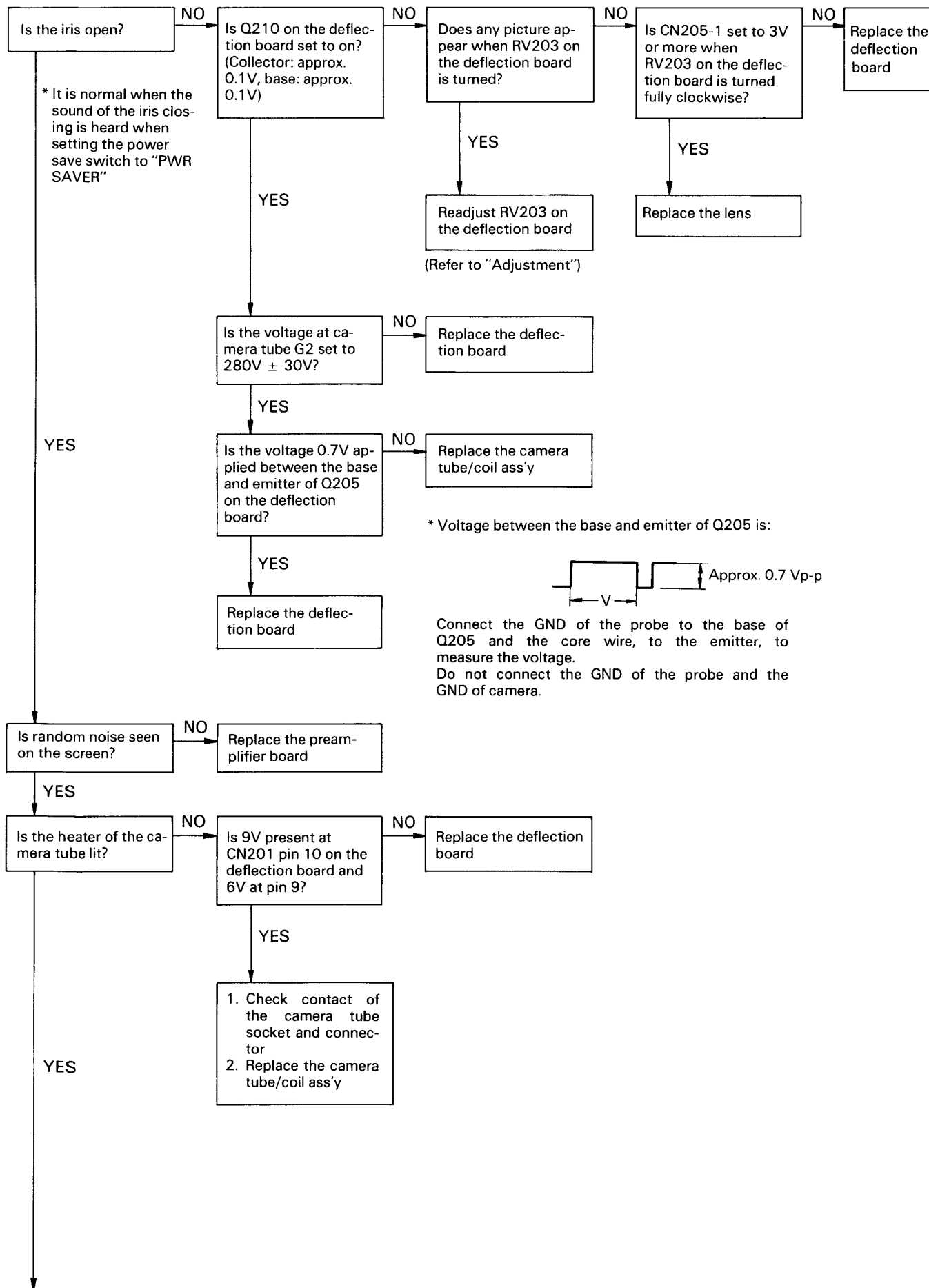
Check the following before checking the circuit.

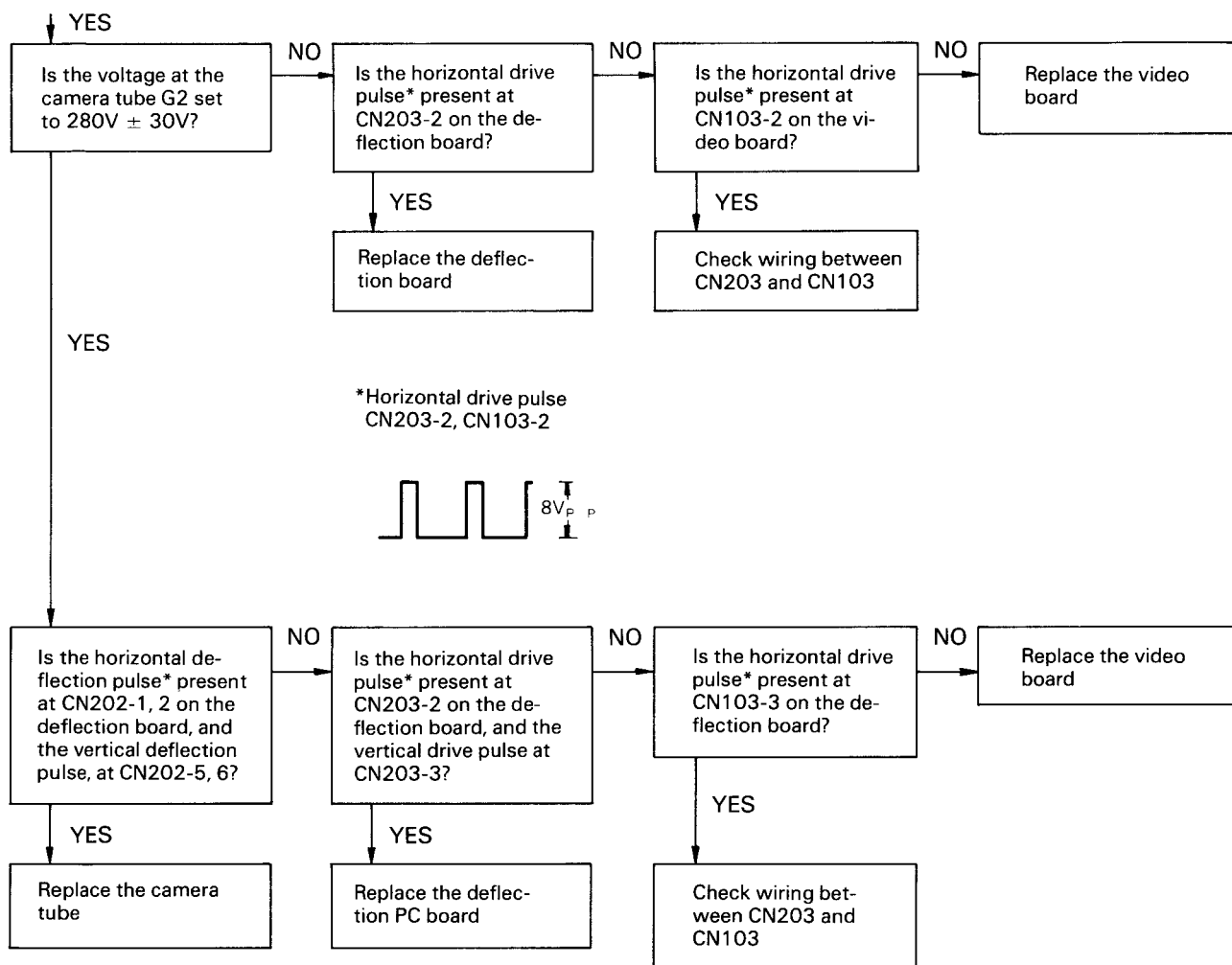
- 1) Connection of each connector and all operation switch positions.
- 2) Power voltage supplied to camera.

1. No picture

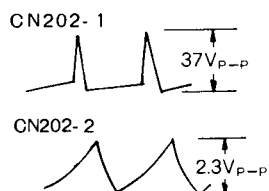


* 1

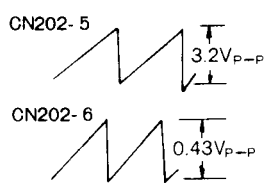




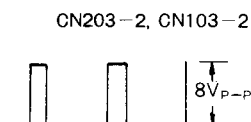
*Horizontal deflection pulse



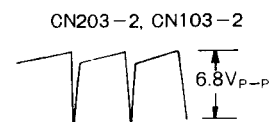
*Vertical deflection pulse



*Horizontal drive pulse



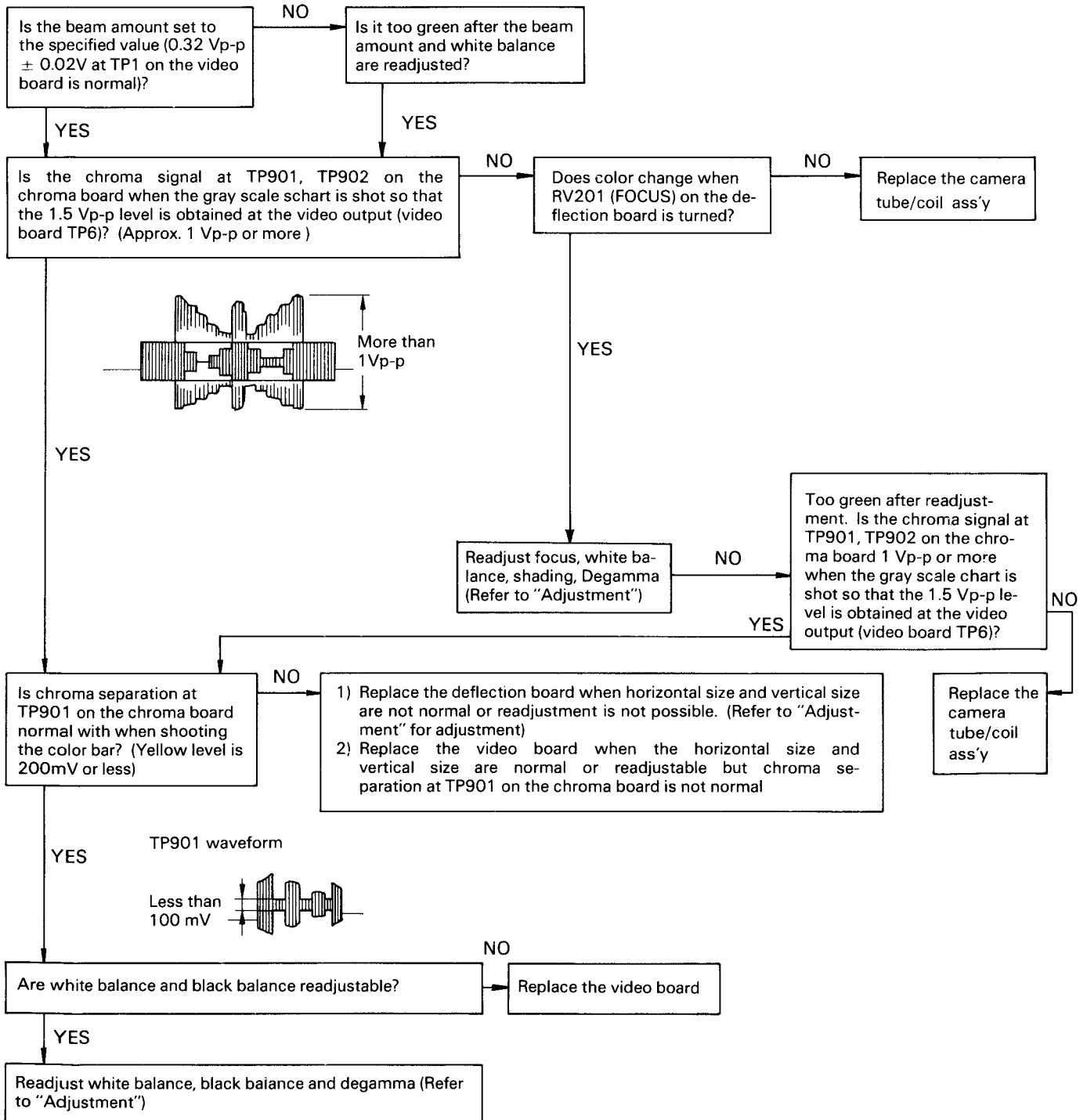
*Vertical drive pulse



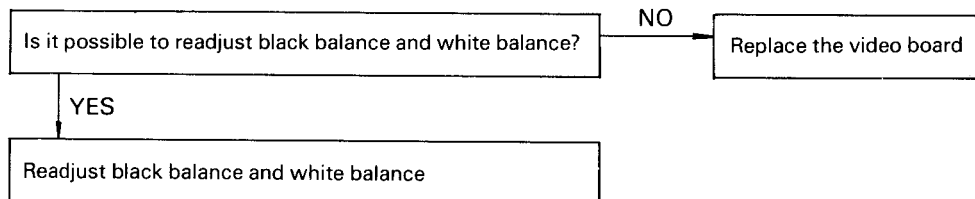
2. Color reproduction faulty

Set the white balance select switch to the position matching the light source and the white balance control to its click position before checking this item.

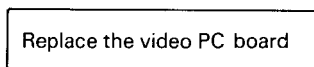
2-1. Too much green



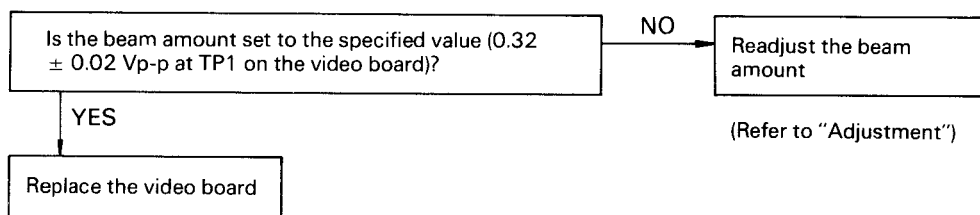
**2-2. Either red, blue or green does not appear
(White balance and black balance are not normal)**



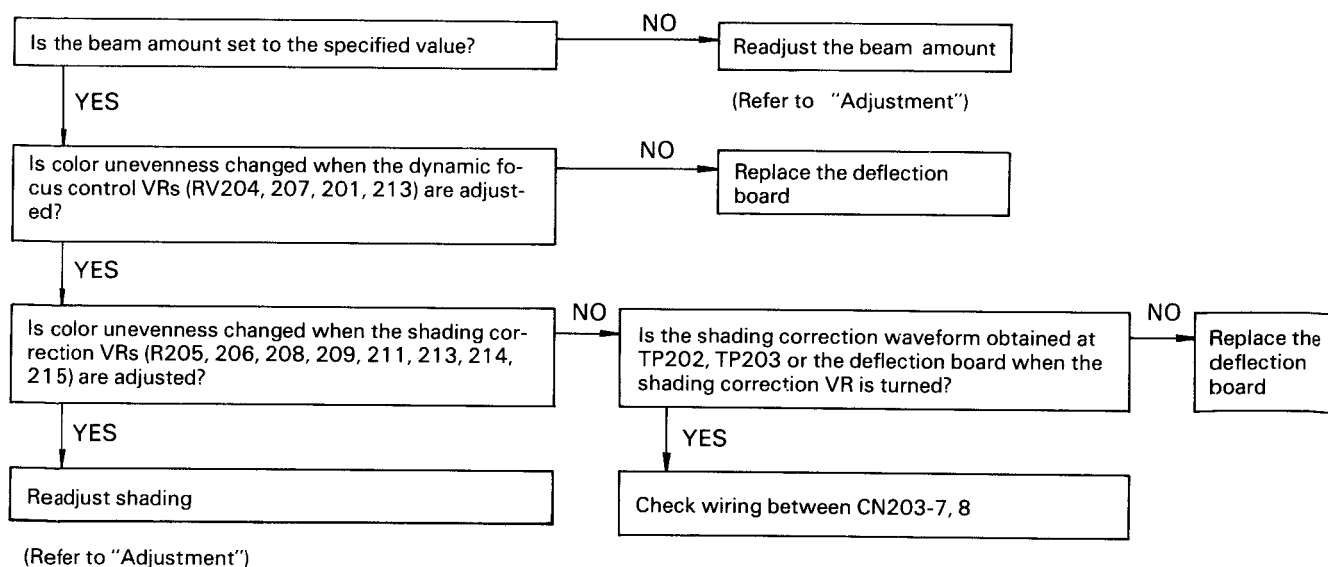
2-3. No color (Picture black and white)



2-4. Highlight sections become green



2-5. Too much color unevenness

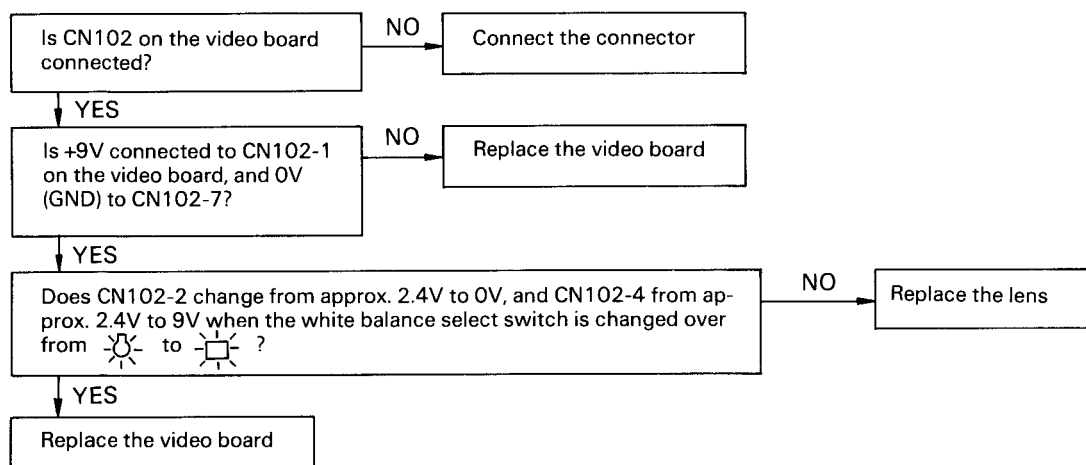


3. Color temperature correction not possible

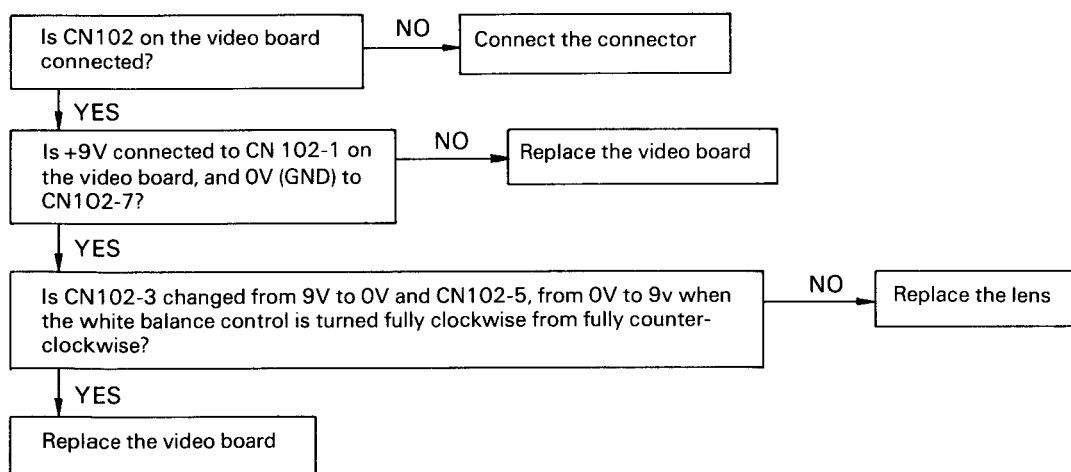
3-1. Tint is not changed when the white balance select switch is changed over from  to .

Replace the lens

3-2. Tint is not changed when the white balance select switch is changed over from  to .

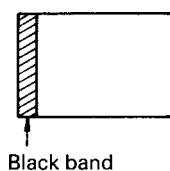


3-3. Red or blue gain does not change when the white balance control is turned
(The screen is reddish or bluish and the "W" indicator is lit in red or green)



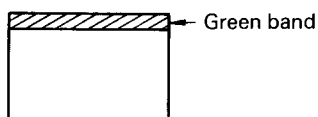
4. Picture missing in the horizontal direction

Adjustment of RV217 (horizontal centering) on the deflection board faulty. (Refer to "Adjustment")



5. Picture missing in the vertical direction

Adjustment of RV219 (vertical centering) on the deflection board faulty. (Refer to "Adjustment")



6. Shadow seen in the picture

Replace the camera tube when the SATICON is burned.
Clean the tube surface when dust adheres to it.

● How to discriminate when dust adheres to the camera tube surface

Dust adhering to the tube surface and scratches (including burn) on the pick-up surface of the camera tube are seen very similar on the TV screen. How to discriminate them is shown in the table.

Shoot a white chart (or very bright, light colored object, etc.).

When a black or white dot or line adheres in a fixed point on the monitor screen and it does not move to another position when the camera is moved, it is considered to be dust or a scratch (including burn).

How to discriminate dust:

Gradually turn iris control knob in the direction of "CLOSED" to darken the screen. When the noise (dirt) becomes clearer and smaller, and becomes shaded and larger when the screen is returned to the original brightness, it is dust.

How to discriminate scratches and burn:

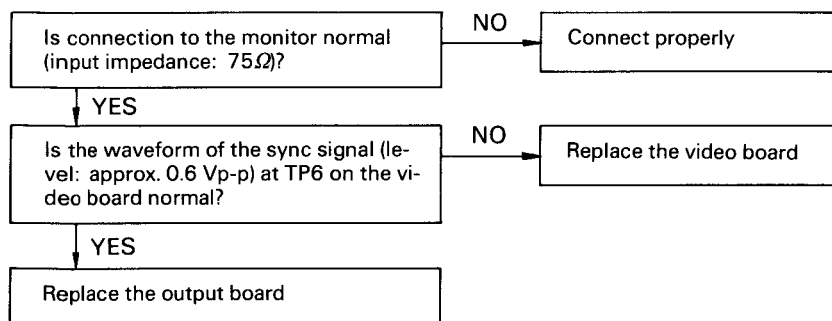
When the iris control knob is turned to make the screen dark but the shading size of the noise on the screen does not change, it is considered to be scratches or burn.

● Removing dust

Remove the lens and clean the pick-up surface of the SATICON using cleaning bar (cotton bud).
(Refer to "Disassembly")

Note: The position of dust on the TV screen and the position of dust with the camera tube viewed from the front have point symmetry (because the picture on the monitor is in reverse to the actual picture).

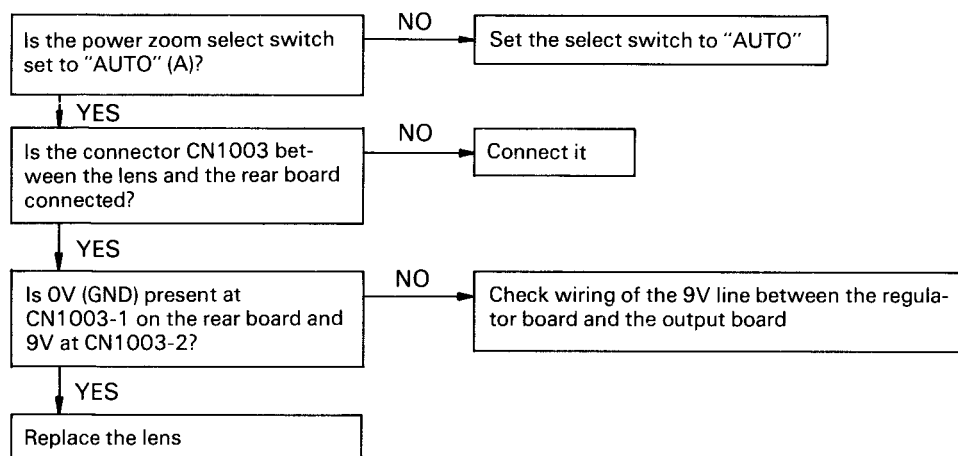
7. No sync



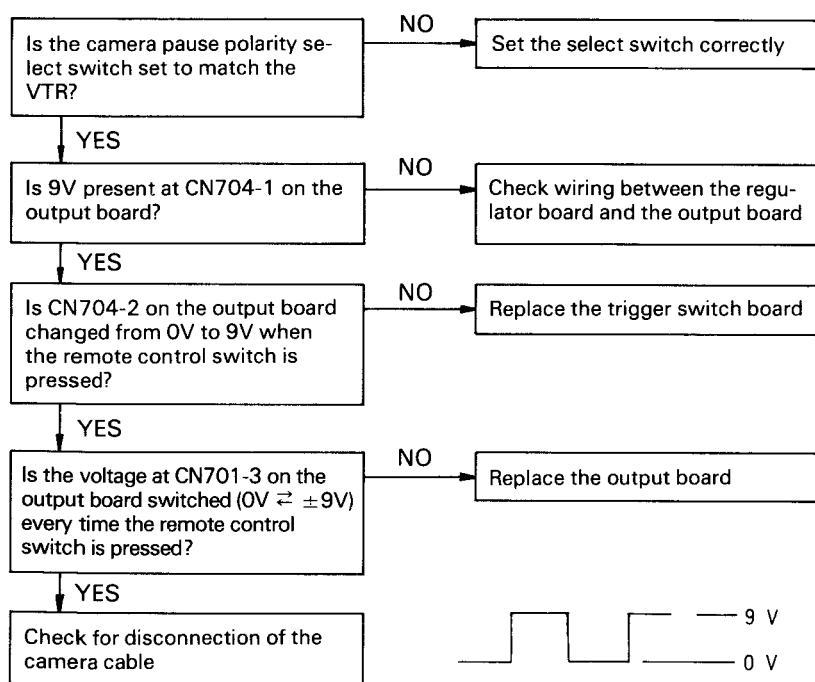
8. Picture has a little smear

Adjustment of CV401 (smear) on the preamplifier board faulty (Refer to "Adjustment")

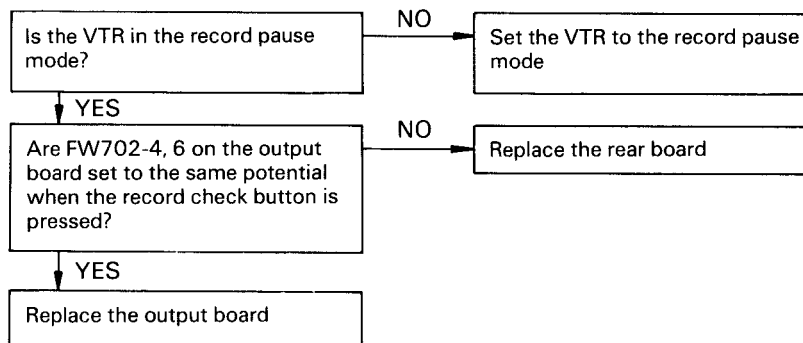
9. Power zoom does not operate



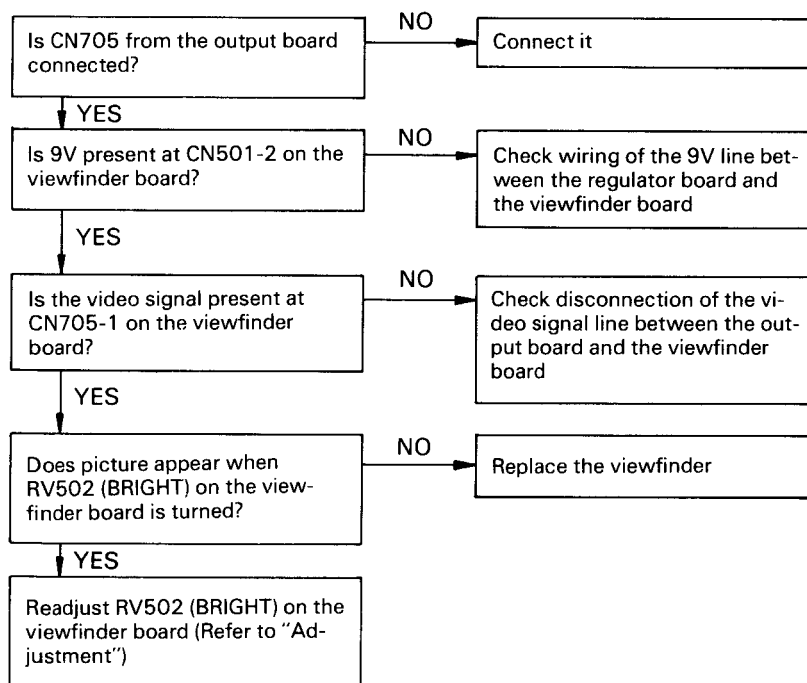
10. Camera pause does not operate properly



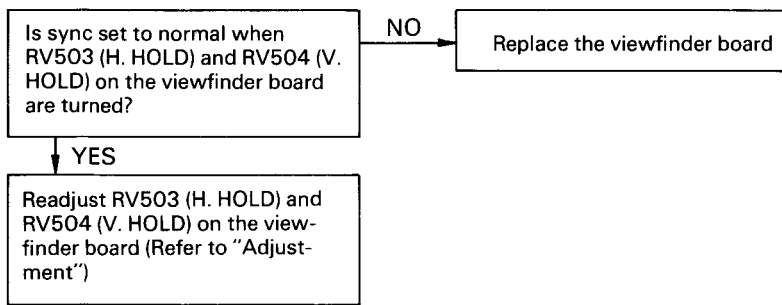
11. Record check function does not operate (VTR normal) when combined with VT-6800



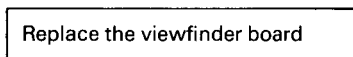
12. No picture in the electronic viewfinder



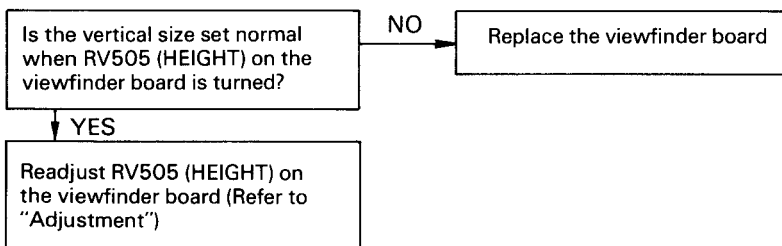
13. Sync of viewfinder in correct



14. Electronic viewfinder picture is a single horizontal line

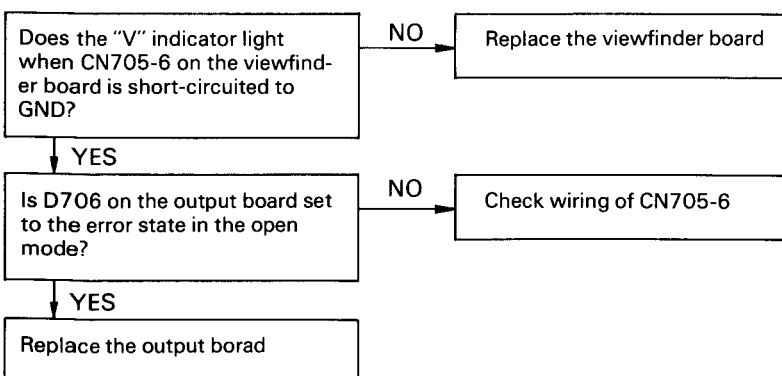


15. Vertical size of the viewfinder picture too short



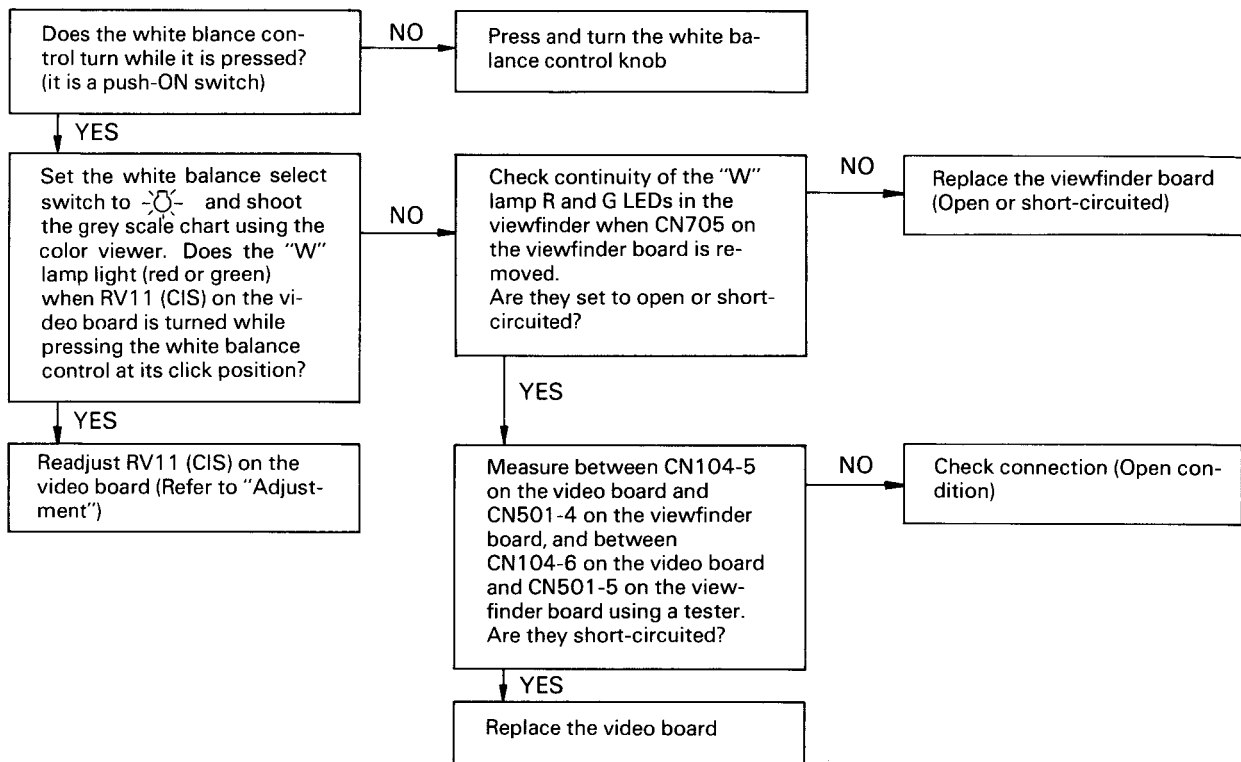
16. "V" indicator does not light when the remote control switch is pressed

When the remote control switch is pressed, the VTR starts or stops but the "V" indicator in the viewfinder does not light.

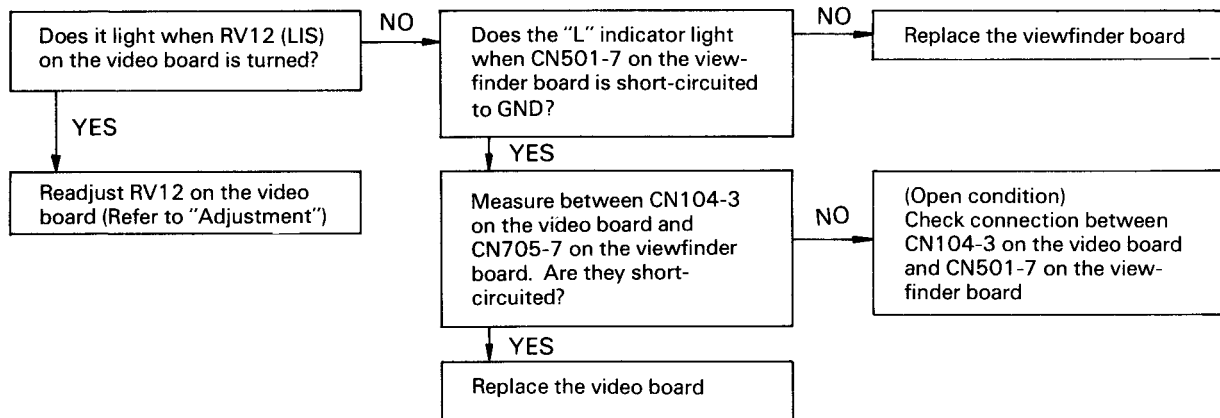


17. "W" indicator does not light when the white balance control is turned

When the white balance control is turned to set the screen reddish, the red "W" indicator in the electronic viewfinder does not light, and when the screen is set to bluish, the green "W" indicator in the viewfinder does not light.

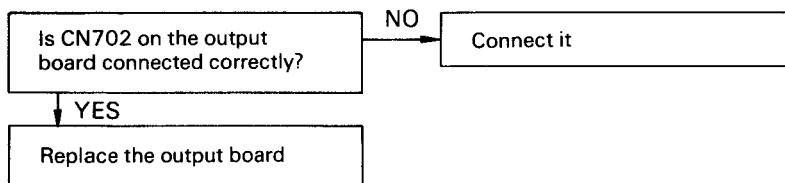


18. "L" indicator in the electronic viewfinder does not light



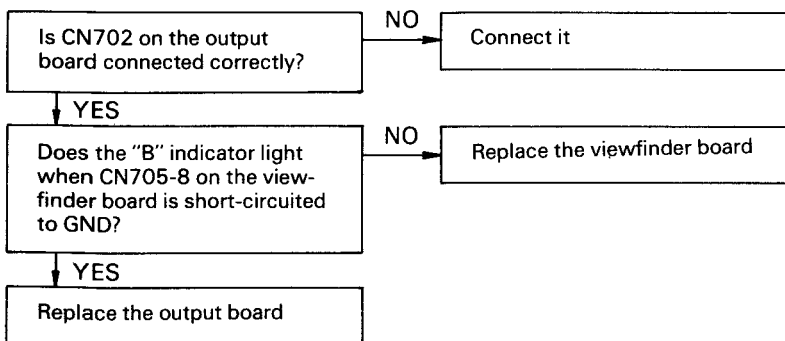
19. "B" indicator lights

The battery is not low but the "B" indicator in the electronic viewfinder tends to light.

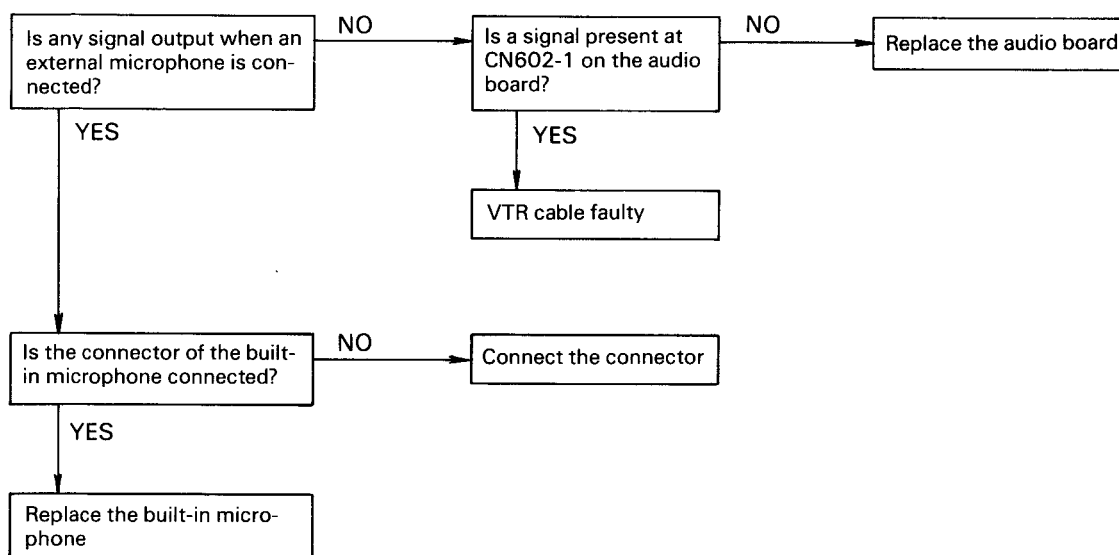


20. "B" indicator does not light

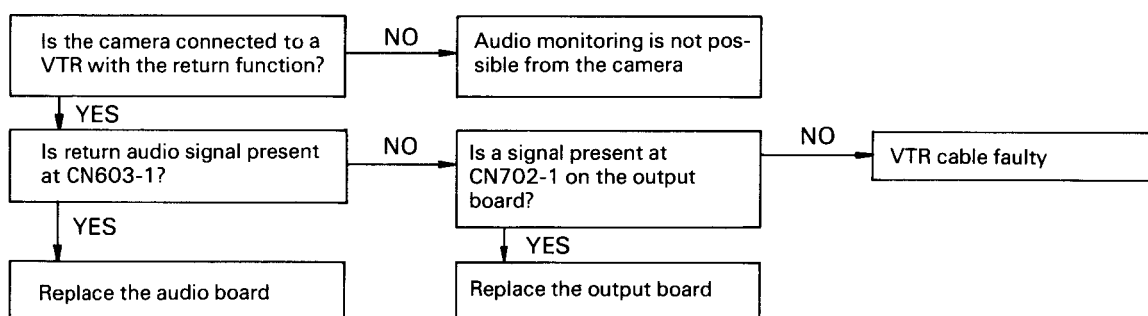
Battery is low but the "B" indicator in the electronic viewfinder does not light.



21. No signal from the built-in microphone



22. Monitoring using the earphone jack on the camera is not possible



ADJUSTMENT

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ADJUSTING PARTS ABBREVIATION LIST

Circuit No.	Abbreviation	Description
RV1	YSET	Y setup
RV2	GSET	Green setup
RV3	RSET	Red setup
RV4	CBC	Chroma black clip
RV5	YPC	Y pulse cancel
RV6	VEB	Video edge balance
RV7	BST	Burst
RV8	CGN	Chroma gain
RV9	BL	Bias light
RV10	RHU	Red hue
RV11	CIS	Color indicator set
RV12	LIS	Level indicator set
RV201	FOC	Focus
RV202	BEAM	Beam
RV203	AVL	Auto iris video level
RV204	DHP	Dynamic focus, Horizontal parabola
RV205	BHP	Blue shading, Horizontal parabola
RV206	RHP	Red shading, Horizontal parabola
RV207	DHS	Dynamic focus, Horizontal sawtooth
RV208	BHS	Blue shading, Horizontal sawtooth
RV209	RHS	Red shading, Horizontal sawtooth
RV210	DVP	Dynamic focus, Vertical parabola
RV211	BVP	Blue shading, Vertical parabola
RV212	RVP	Red shading, Vertical parabola
RV213	DVS	Dynamic focus, Vertical sawtooth
RV214	BVS	Blue shading, Vertical sawtooth
RV215	RVS	Red shading, Vertical sawtooth
RV216	HLN	Horizontal linearity
RV217	HCT	Horizontal centering
RV218	HGT	Height
RV219	VCT	Vertical centering
RV220	RDS	Red degamma slice level
RV221	RDG	Red degamma gain
RV222	BDG	Blue degamma gain
RV223	BDS	Blue degamma slice level
LV201	WID	Width
CV401	SMR	Smear
RV501	CONTR	Contrast
RV502	BRIGHT	Brightness
RV503	H.HOLD	Horizontal hold
RV504	V.HOLD	Vertical hold
RV505	HEIGHT	Height
RV506	FOCUS	Focus
CV801	SCF	Subcarrier frequency
LV801	PLL	Phase locked loop
RV901	CPS	Carrier phase
RV902	BGN	Black gain
RV903	CCL	Chroma carrier level
RV904	CBAL	Carrier balance
RV905	RGN	Red gain
RV1101	REG	Regulator

BEFORE STARTING ADJUSTMENT

Check the following before starting adjustment.

1. Connection

Connection between the camera, power supply and TV set, etc.

2. Measuring instruments and tools, etc., used for adjustment.

- Measuring instruments
Oscilloscope, frequency counter, DC voltmeter
- Tools, etc.
(+) screwdriver (medium), (-) screwdriver (small), adjusting screwdriver, soldering iron, color viewer (3100°), test chart A, gray scale chart, color bar chart, resistors 4.7 k Ω ~ 10 k Ω (1/8 ~ 1/2 W) tripod, monitor TV set.

3. Preparation

- Set distance between the camera lens and color viewer to 1m.

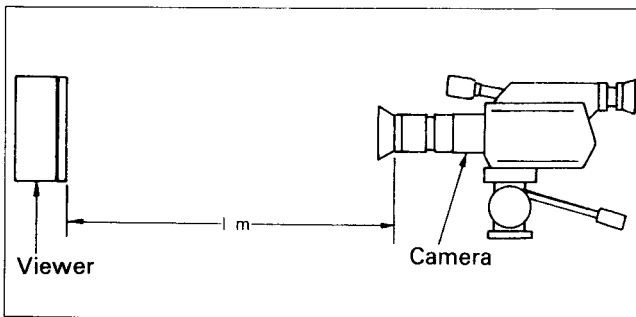


Fig. 1

- Camera operation switch positions
Power save switch: Set to PWR SAVER during preparation (NORM during adjustment)
- Iris control: Click position
- White balance select switch: Position  (bottom)
- White balance control: Click position
- Use CN103 (video board) and CN203 (deflection board) when applying external sync.
V period: CN203, CN103 Pin 3
H period: CN103, CN203 Pin 2
- GND-video board: TP5, deflection board: TP205
- Video signal output: Video board TP6
- Set the power save switch of the camera to NORM and then set the switch of the color viewer to ON when starting adjustment. Be sure to observe this procedure. If it is done in reverse, the SATICON tube may be burnt.
- Shoot the chart for the full video period when otherwise not specified, when shooting the chart.

- Set the time axis of the oscilloscope to the H period (horizontal period) in general. Switch over to the V period when specified.
- "White chart" means "shoot without inserting a chart into the color viewer".
- Set the probe to 10:1 in general.

ADJUSTMENT

* ADJUSTMENT BEFORE/AFTER REPLACING CIRCUIT BOARD

Adjustment after replacing the camera tube/coil ass'y and after replacing circuit boards are described independently. Perform the adjustment specified in the following item 1 ~ 5 when it is specially required before/after adjustment.

Apply items 1 ~ 3 before adjustment after replacement

Apply items 4, 5 after adjustment after replacement

Adjustment is not required after replacing the output circuit board, rear circuit board and audio circuit board.

1. Power voltage adjustment

- When the DC voltage at TP1101 on the regulator board is not set to $9V \pm 0.05V$;
RV1101: Regulator board
TP1101: Regulator board
 - 1) Connect a DC voltmeter to TP1101 on the regulator board.
 - 2) Adjust RV1101 so that the voltmeter indicates $9V \pm 0.05V$.

2. Sub-carrier frequency adjustment

- When color lock is released or hue is drifted;
CV801: SSG board
TP4 : Video board
 - 1) Connect a frequency counter to TP4 on the video board.
 - 2) Adjust CV801 so that the counter indicates $4.43361875 \text{ MHz} \pm 100 \text{ Hz}$.

3. PLL adjustment

- When hue drift is too much or color beats occur;
VL801: SSG board
TP801: SSG board
 - 1) Remove the shield cover from the SSG board.
 - 2) Connect a DC voltmeter to TP801 on the SSG board. (or use an oscilloscope set to the DC range)
 - 3) Adjust VL801 so that the voltmeter indicates $3V \pm 0.1V$.

4. Level indicator adjustment

- When the gray scale chart is shot, an oscilloscope is connected to TP6 on the video board and the video level is reduced to $0.88 \text{ Vp-p} \pm 0.2\text{V}$ by the iris control but the "L" indicator does not light;

Iris control: Back of camera

RV12 : Video board

TP6 : Video board

- 1) Shoot the gray scale chart.
- 2) Connect the oscilloscope to TP6 on the video board.
- 3) Adjust the iris control so that the video signal is $0.88 \text{ Vp-p} \pm 0.2\text{V}$.

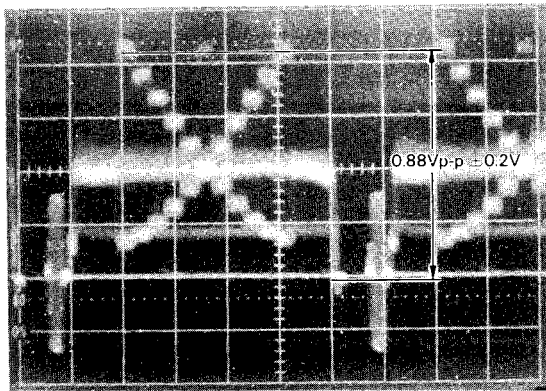


Fig. 2

- 4) Adjust RV12 so that the "L" indicator goes out.

5. White balance indicator adjustment

- When the gray scale is shot, the white balance select switch is set to  and white balance check is done with the white balance control set to the click position but the "W" indicator lights red or green;

Note: Both red and green indicators light during the power save mode.

RV11: Video board

- 1) Shoot the gray scale chart.
- 2) Set the white balance control to its click position and press it continuously.
- 3) Adjust RV11 to set to the center point of the range in which the "W" indicator goes out.

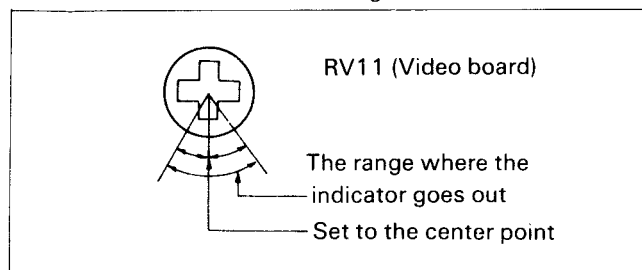


Fig. 3

1. ADJUSTMENT AFTER REPLACING CAMERA TUBE/COIL ASS'Y

1. Beam voltage adjustment

RV202: Deflection board

(RV201, 216, 217, 218, 219, LV201: Deflection board)

TP6, TP1: Video board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot the test chart A.
- 3) Turn RV202 clockwise to make the picture appear when the picture does not appear on the TV screen.
- 4) Bring the picture into focus while observing the TV screen.

Adjust RV201 to bring the picture into focus.

* Item 5 is not required when the circle of the chart appears round while observing the TV screen.

- 5) When the circle of the chart is not round on the TV screen, adjust the control VRs shown below so that it is made round and the size roughly matches.

RV216: Horizontal linearity

RV217: Horizontal centering

LV201: Horizontal size (WIDE)

RV218: Vertical size (HEIGHT)

RV219: Vertical centering

- 6) Connect an oscilloscope to TP1 on the video board.

- 7) Shoot the chart as shown in Fig. 4.

Set the zoom to the same position as that when the test chart A is shot in item 2.

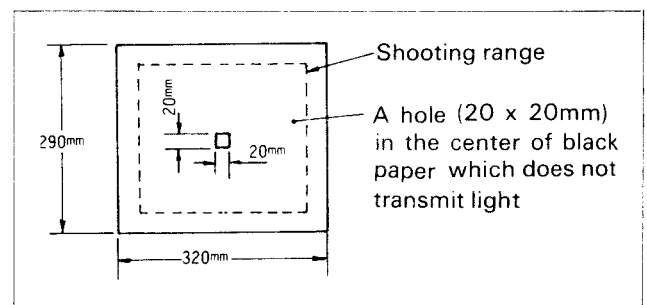


Fig. 4

- 8) Adjust RV202 so that the click level of the beam is $0.32 \text{ Vp-p} \pm 0.02\text{V}$.

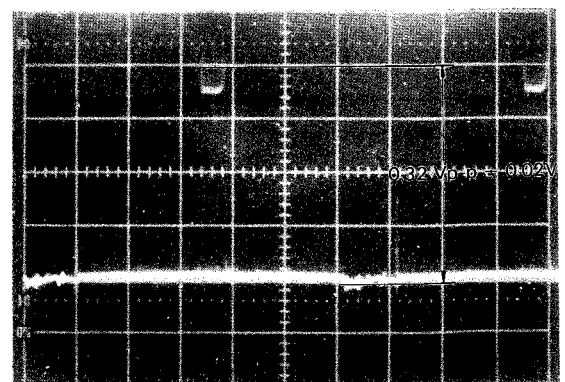


Fig. 5

When the left and right click levels of the waveform differ, match them to the average of both levels. When a carrier is present above the level, adjust the level with the carrier removed.

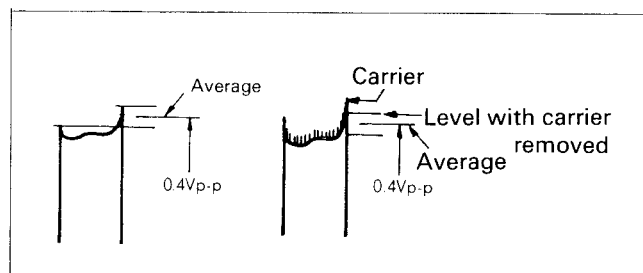


Fig. 6

2. Back-focus adjustment

- 1) Set the distance between the color viewer and camera lens surface to 3 m.

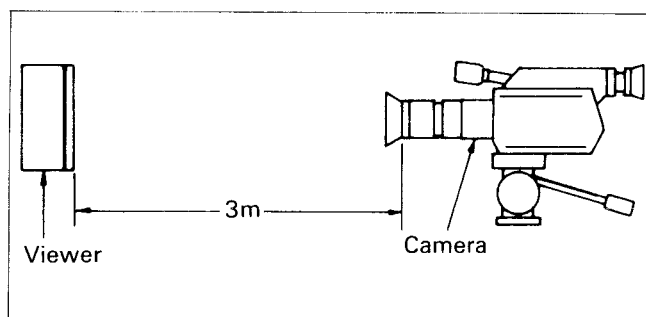


Fig. 7

- 2) Shoot the test chart A.
- 3) Adjust zoom to set to TELEPHOTO and focus using the lens focus ring.
- 4) Next set the lens to WIDE.
- 5) Loosen the back-focus fixing screw of the lens, turn the focus control screw to focus.

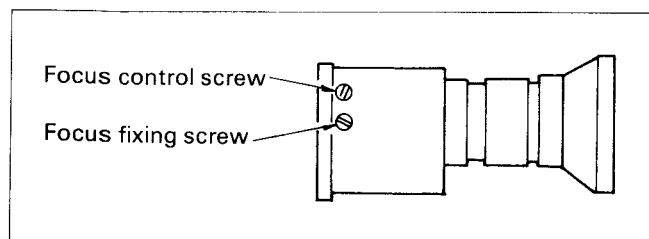


Fig. 8

- 6) Set the zoom to TELEPHOTO again and focus using the lens focus ring.
- 7) Repeatedly adjust TELEPHOTO and WIDE so that both are focused. Set the index to match 3 m when TELEPHOTO and WIDE are both focused.
- 8) Check that it is in focus when the index is set to " ∞ " and a remote object (10 m or more away) is shot.

3. Horizontal size/linearity adjustment

RV216, 217, LV201: Deflection board

TP6: Video board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot a white chart and set the zoom to TELEPHOTO.
- 3) Turn LV201 to shorten the waveform width and make optical black appear a little to the left and right.

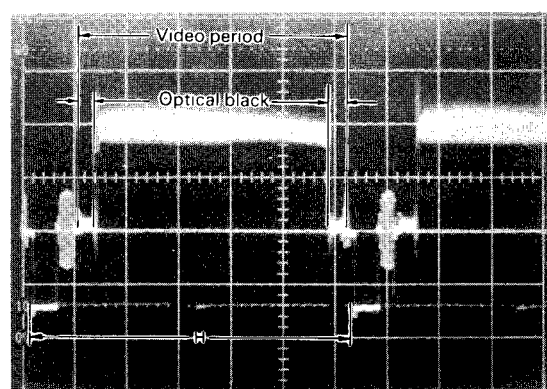


Fig. 9

- 4) Adjust RV217 so that the left and right optical black is symmetrical.
- 5) Shoot the test chart A.
- 6) Adjust RV216 so that the circle on the TV screen is symmetrical to the left and right.
- 7) Shoot a white chart and set the zoom to TELEPHOTO.
- 8) Adjust LV201 so that the optical black mask remains a little on the left and right. Fine adjust RV217 at this time so that the optical black mask is symmetrical on the left and right.

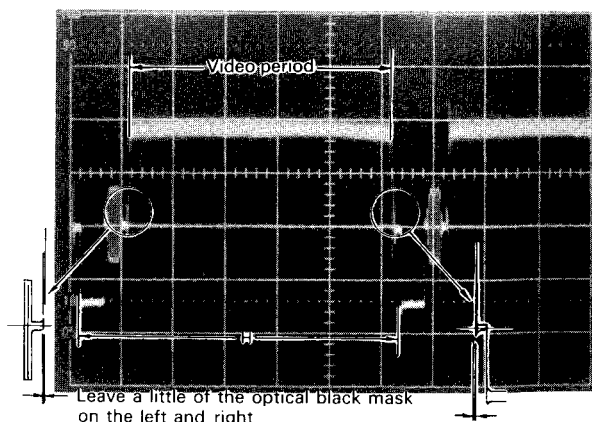


Fig. 10

4. Vertical size/centering adjustment

RV218, 219: Deflection board

TP6, TP1 : Video board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot the white chart and set the zoom to TELE-PHOTO.
- 3) Set the oscilloscope to the V period.
- 4) Turn RV218 to shorten the wave width and make black mask appear a little on the left and right.

* The black mask is seen as a green horizontal bar on the TV screen.

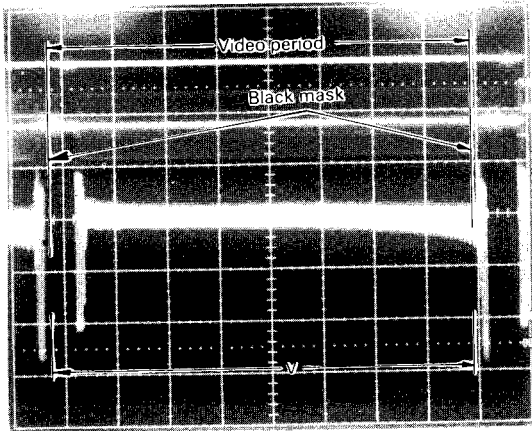


Fig. 11

- 5) Adjust RV219 so that the black mask is symmetrical on the left and right.
- 6) Connect the oscilloscope set to the V period to TP1 on the video board.
- 7) Adjust RV218 so that beats in the waveform are minimum.

* When RV218 is turned, the width increases as beats in the waveform decrease. Adjust finely RV219 so that the black mask is symmetrical on the left and right.

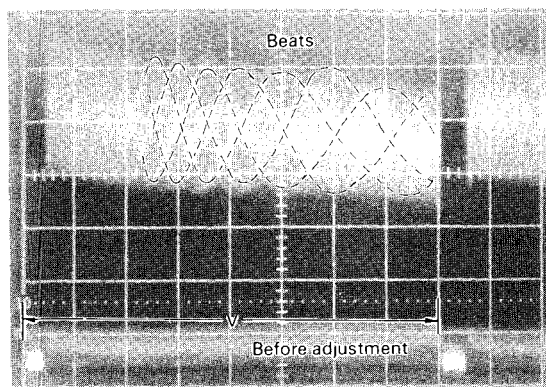


Fig. 12

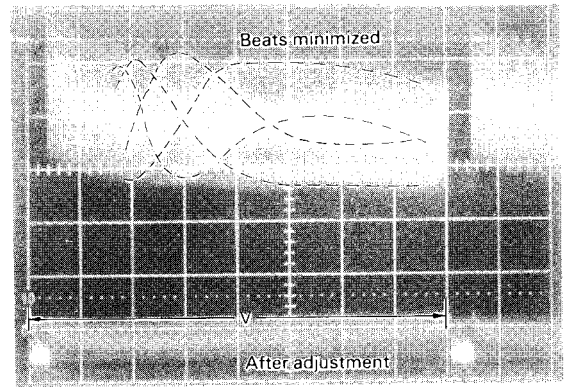


Fig. 13

5. Bias light adjustment

RV9: Video board

TP1: Video board

- 1) Fit the lens cap.
- 2) Set the oscilloscope to 1:1 and connect it to TP1 on the video board via a resistor (4.7kΩ ~ 10kΩ).

* When the probe is held near the tip, noise is picked up.

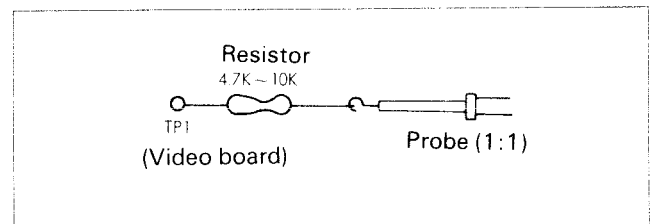


Fig. 14

- 3) Adjust RV9 so that the level at the waveform center is 5mVp-p ± 1mV.

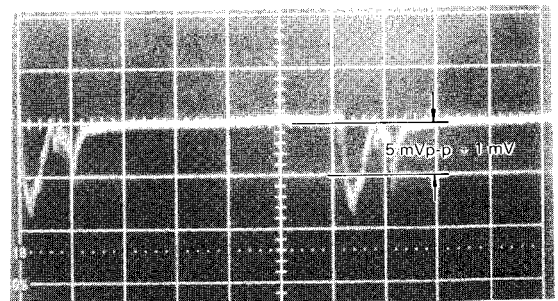


Fig. 15

6. Pulse canceller adjustment

RV1, 5: Video board

Iris control: Back of camera

TP6: Video

- 1) Fit the lens cap.
- 2) Connect an oscilloscope to TP6 on the video board.
- 3) Adjust RV1 so that setup is 0.4V.
- 4) Adjust RV5 so that the setup level of the waveform does not change when the iris control is alternately moved from fully open to fully closed.

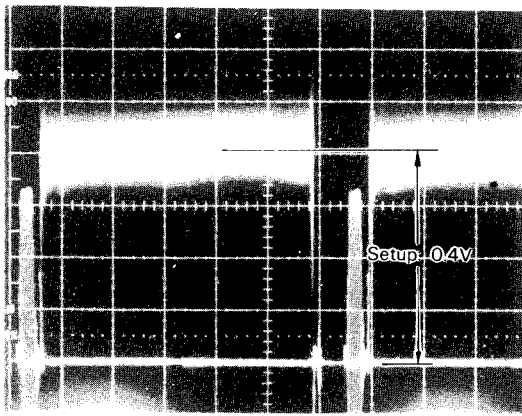


Fig. 16

7. Y setup adjustment

RV1: Video board

TP6: Video board

- 1) Fit the lens cap.
- 2) Connect an oscilloscope to TP6 on the video board.
- 3) Adjust RV1 so that the setup level is $60 \text{ mVp-p} \pm 40 \text{ mV}$.

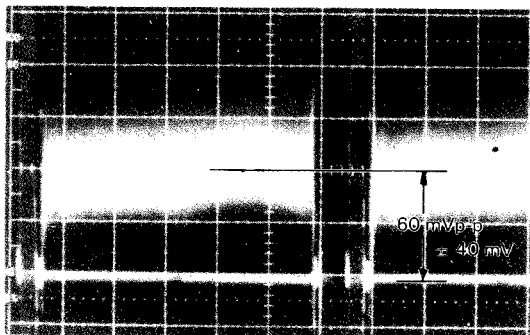


Fig. 17

8. Edge balance adjustment

RV6: Video board

TP6, TP2: Video board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot a gray scale chart.
- 3) Connect the oscilloscope to TP2 on the video board.
- 4) Set the input range of the oscilloscope to 10 mV/div ($10:1$ probe used).
- 5) Adjust RV6 so that the waveform (video signal) is minimized.

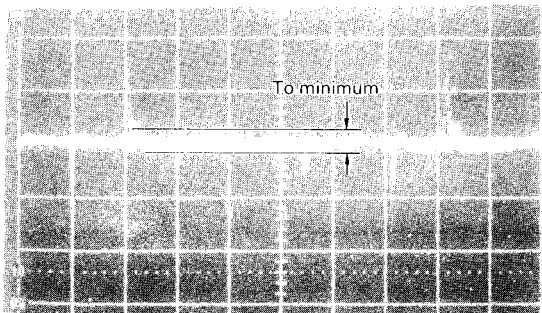


Fig. 18

9. Video level adjustment

RV203: Video board

TP6: Video board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot the gray scale chart.
- 3) Adjust RV203 so that the video signal component of the waveform is $1.5 \text{ Vp-p} \pm 0.06 \text{ V}$.

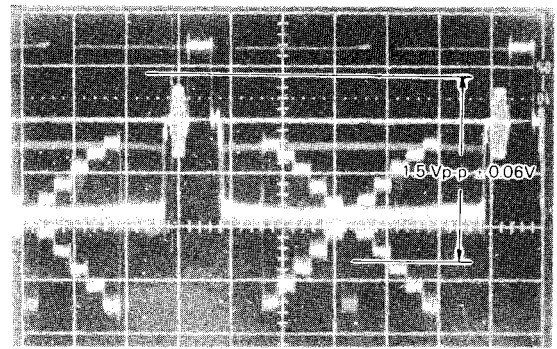


Fig. 19

10. Field focus adjustment

RV201, 204 ~ 215: Deflection board

TP201 ~ 203: Deflection board

TP901: Chroma board

- 1) Set RV204 ~ 215 to their mechanical centers. (Or fit the lens cap and set the waveforms at TP201, 202, 203 to minimum)
Use the oscilloscope with the input range set to 5 mV/div (probe $10:1$).

TP201 waveform: Minimize using RV204, 207, 210, 213

TP202 waveform: Minimize using RV205, 208, 211, 214

TP203 waveform: Minimize using RV206, 209, 212, 215

- 2) Connect an oscilloscope to TP901 on the chroma board.

- 3) Shoot a white chart and set to TELEPHOTO.

- 4) Adjust RV201 so that the carrier level is max. and the flat range without peaks or troughs is as wide as possible.

* This is to facilitate shading correction later.

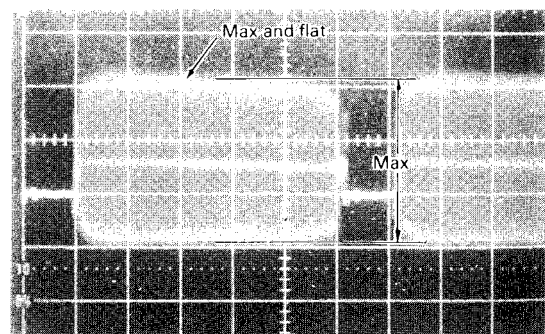


Fig. 20

11. Chroma carrier level adjustment

RV903: Chroma board

RV220, 222: Deflection board

TP901: Chroma board

- 1) Turn RV220, RV222 fully counterclockwise.
- 2) Connect an oscilloscope to TP901 on the chroma board.
- 3) Shoot the gray scale chart.
- 4) Adjust RV903 so that the waveform level is $1.5 \text{ Vp-p} \pm 0.5 \text{ V}$.

* Use the oscilloscope with the probe set to 1:1. Otherwise, the black portion (1st ~ 4th steps from the bottom) of the waveform is distorted.

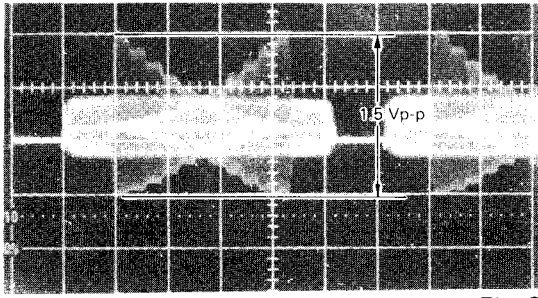


Fig. 21

12. Color separation adjustment

TP901: Chroma board
RV901, 904: Chroma board

- 1) Connect an oscilloscope to TP901 on the chroma board.
- 2) Shoot the color bar chart.
- 3) Alternately adjust RV901 and RV904 to minimize the yellow level of the color bar chart.

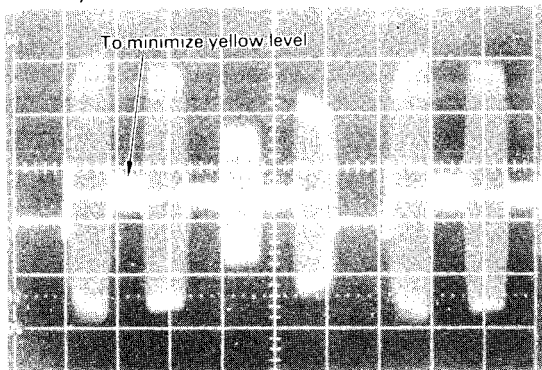


Fig. 22

13. Black balance adjustment

TP6, TP3: Video board
RV2, 3, 4: Video board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot the gray scale chart.
- 3) Turn RV4 fully counterclockwise.
- 4) Alternately adjust RV2 and RV3 to minimize the carrier at the 2nd and 3rd steps from the bottom of the staircase wave.
- 5) Connect the oscilloscope to TP3 on the video board. (The burst signal and sync signal are not contained in the TP3 waveform)
- 6) Adjust RV4 so that the bottom level of the staircase waveform is $40 \text{ mVp-p} \pm 10 \text{ mV}$.

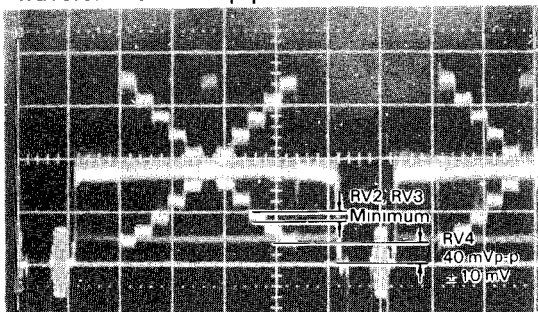


Fig. 23

14. White balance adjustment (I)

TP6: Video board
RV902, 905: Deflection board
RV220, 222: Deflection board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Turn RV220, 222 fully counterclockwise. (When it is left as it is set in item 11, this item is not required).
- 3) Shoot the gray scale chart.
- 4) Alternately adjust RV902 and RV905 to minimize the carrier at 6th ~ 8th steps from the bottom of the staircase waveform.

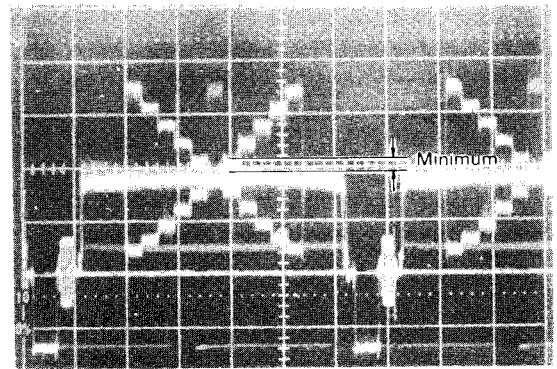


Fig. 24

The adjustment shown in items 15 ~ 17 is the adjustment method applied when an oscilloscope with both the INV (invert) and ADD (addition) functions is used. When the oscilloscope is not provided with either function, perform the adjustment shown in items 15' ~ 17'.

15. Dynamic focus adjustment

(TP201 ~ 203: Deflection board)
TP6: Video board
Iris control: Back of camera
TP3, TP8: Video board
RV204, 207, 210, 213: Deflection board

- 1) Set all RV205, 206, 208, 209, 211, 212, 214, 215 to their mechanical centers or minimize the waveforms at TP202, 203. (When they are left as set in item 10, the above is not required)
- 2) Connect an oscilloscope to TP6 on the video board.
- 3) Shoot the white chart and set the zoom to TELE-PHOTO.
- 4) Adjust the iris control so that the video level is 0.8 Vp-p (Direction to open the iris.)

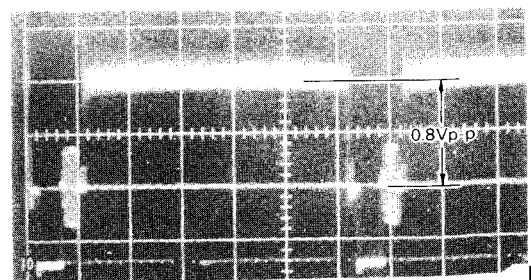
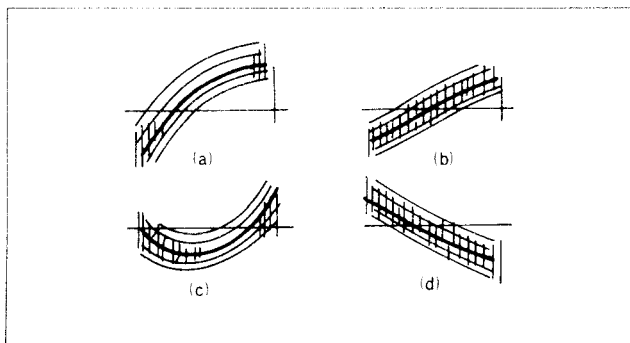


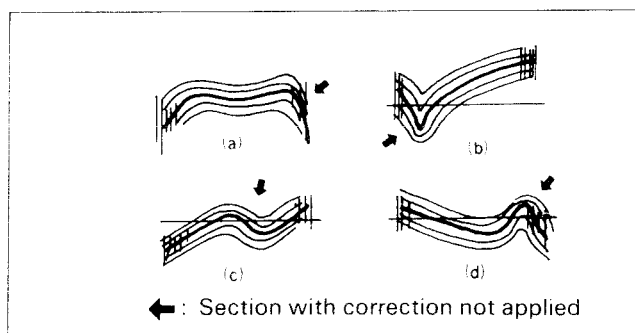
Fig. 25

- 5) Connect the channel of the oscilloscope which can be inverted to TP3 (YL) on the video board and set it to the INV mode. Connect TP8 (R) on the video board to other channel.
- 6) Set the input range of the oscilloscope for both channels to 10 mV/div (10:1 probe used) to set to the ADD mode.
- 7) Adjust RV204, 207 to obtain a waveform making it easy to correct shading.



Waveform making it easy to correct shading

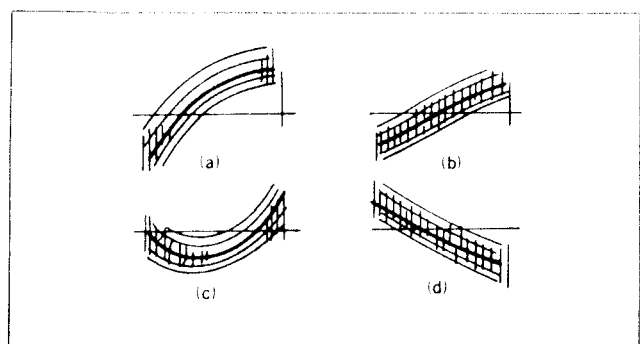
Fig. 26



Waveform making it difficult to correct shading

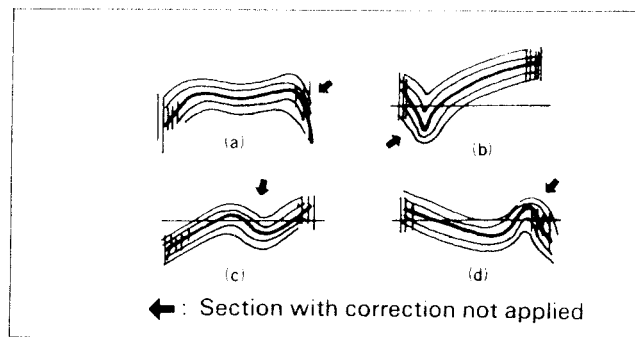
Fig. 27

- 8) Set the oscilloscope to the V period.
- 9) Adjust RV210, 213 to make the waveform easy to correct shading.



Waveform making it easy to correct shading

Fig. 28



Waveform making it difficult to correct shading

Fig. 29

- 10) When the waveform making it easy to correct shading is not obtained by the above adjustment, adjust the field focus in item 10 and then perform adjustment in 7 ~ 9, item 15 again.

16. Red/modulation shading adjustment

TP3, TP8: Video board

RV206, 209, 212, 215: Deflection board

- 1) Perform adjustment shown in 2 ~ 4, item 15.
- Note: Readjustment is not required when the iris control has not been changed.
- 2) Connect an oscilloscope as in 5 ~ 6, item 15. Connect TP3 (YL) on the video board to the channel which can be inverted and TP8 (R) to the other channel, and set TP3 to the INV mode and then to the ADD mode.
- 3) Adjust RV206, 209 so that the waveform is as flat as possible.

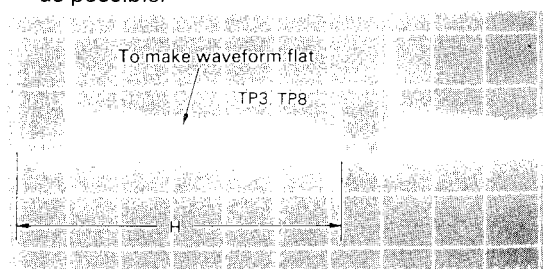


Fig. 30

- 4) Set the oscilloscope to the V period.
- 5) Adjust RV212, 215 to make the waveform flat.
- * Adjust so that the flat section of the waveform fills the video period.

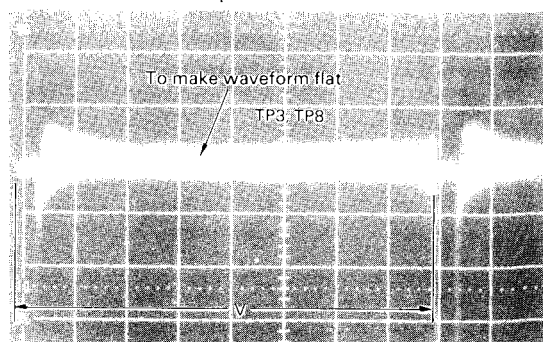


Fig. 31

17. Blue/modulation shading adjustment

TP3, TP7: Video board

RV205, 208, 211, 214: Deflection board

1) Perform adjustment shown in 2 ~ 4, item 15.

Note: Readjustment is not required when the iris control has not been changed.

2) Connect the channel of the oscilloscope which can be inverted to TP3 (YL) on the video board and set to the INV mode. Connect the other channel to TP7 (B) on the video board to set to the ADD mode.

Input range: 10 mV/div (10:1 probe used)

3) Adjust RV205, 208 to make the waveform flat.

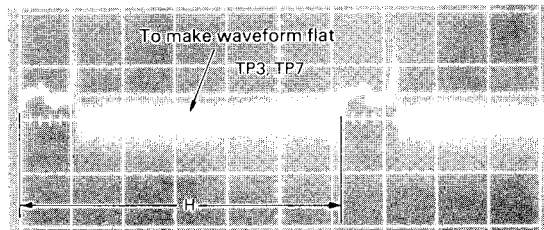


Fig. 32

4) Set the oscilloscope to the V period.

5) Adjust RV212, 214 to make the waveform flat.

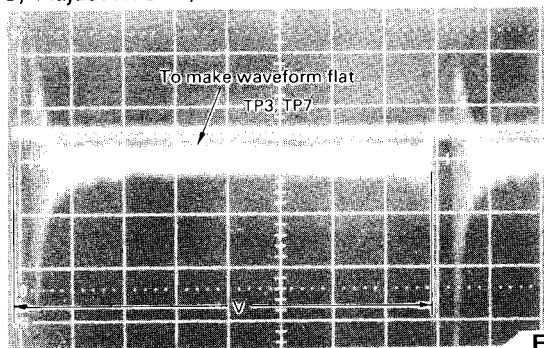


Fig. 33

Adjustment when an oscilloscope which is not provided with either INV or ADD function is used.

15'. Dynamic focus adjustment

(TP202, 203: Deflection board)

TP6: Video board

Iris control: Back of camera

TP3, TP8: Video board

RV204, 207, 210, 213: Deflection board

1) Set all RV205, 206, 208, 209, 211, 212, 214, 215 to their mechanical centers or minimize the waveforms at TP202, 203.

(When they are left as set in item 10, the above is not required)

2) Shoot the white chart and zoom to TELEPHOTO.

3) Connect the oscilloscope to TP6 on the video board.

4) Adjust the iris control so that the video level is 0.8 Vp-p.

(Direction to open the iris)

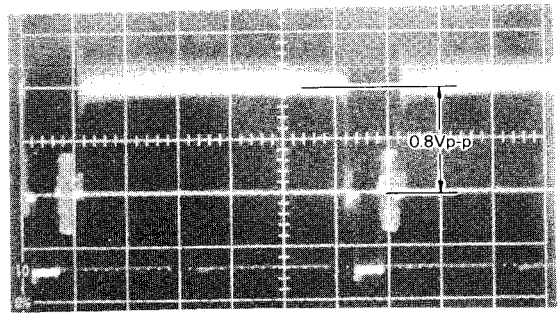
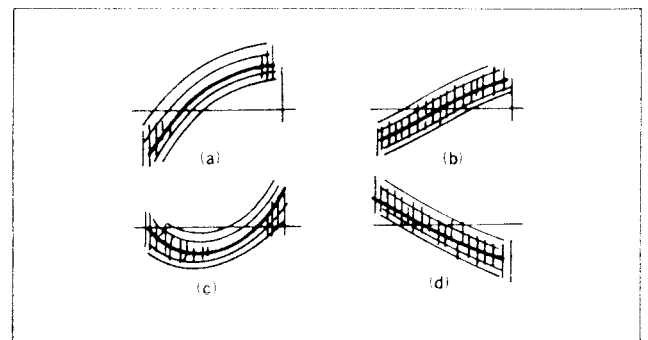


Fig. 34

5) Connect one channel of the oscilloscope to TP3 (YL) on the video board and the other channel to TP8 (R)

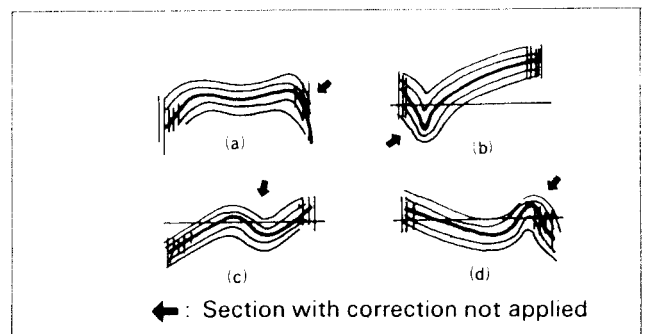
6) Set the input range of the oscilloscope to 10 mV/div (10:1 probe used) for both channels and set to the DUAL mode.

7) Adjust RV204, 207 so that the waveforms at TP3 and TP8 are easy to correct shading.



Waveform making it easy to correct shading

Fig. 35

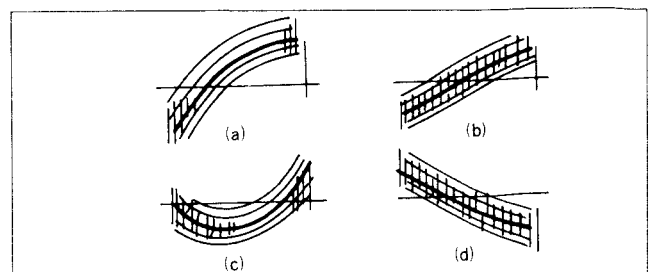


Waveform making it difficult to correct shading

Fig. 36

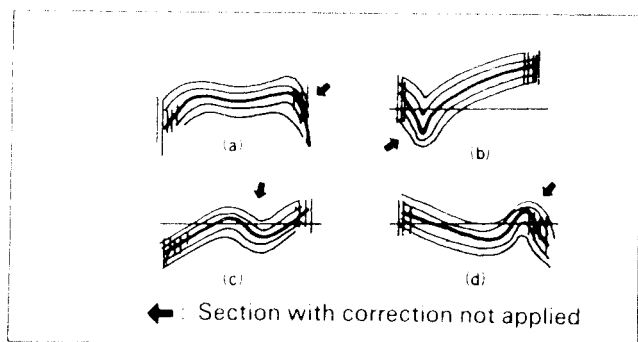
8) Set the oscilloscope to the V period.

9) Adjust RV210, 213 so that the waveforms at TP3 and TP8 are easy to correct shading.



Waveform making it difficult to correct shading

Fig. 37



Waveform making it difficult to correct shading

Fig. 38

- 10) When the waveform making it easy to apply shading correction cannot be obtained by the above adjustment, adjust the field focus in item 10, and then adjust as shown in 7 ~ 9, item 15' again.

16'. Red/modulation shading adjustment

TP3, TP8: Video board

RV206, 209, 212, 215: Deflection board

- 1) Perform adjustment shown in 2 ~ 4, item 15'.

Note: When the iris control has not been changed, it is not required to readjust.

- 2) Connect the oscilloscope the same as in 5, 6, item 15'. Connect TP3 and TP8 on the video board to the corresponding channels of the oscilloscope.

Set the input level to 10 mV/div (10:1 probe used) for both channels.

- 3) Adjust RV206, 209 so that the waveforms at TP3 and TP8 are the same. Overlap the waveforms after adjustment to check that the two waveforms are the same.

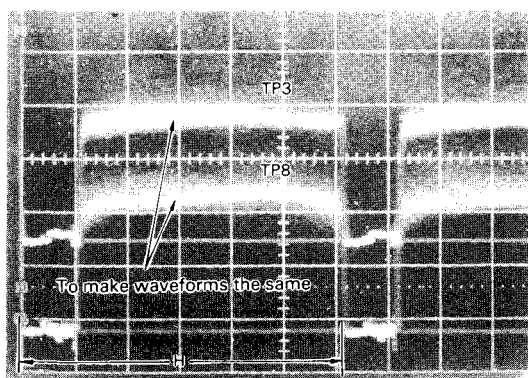


Fig. 39

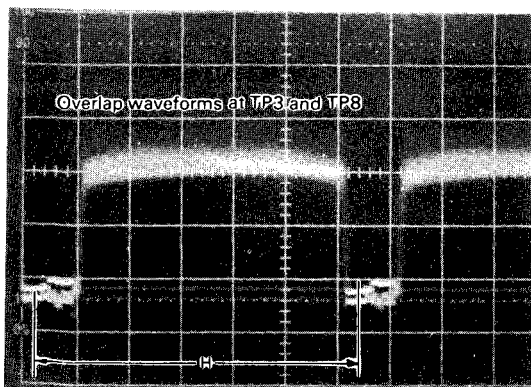


Fig. 40

- 4) Set the oscilloscope to the V period.

- 5) Adjust RV212, 215 so that the waveforms at TP3 and TP8 are the same. Overlap the two waveforms after adjustment to check that the two waveforms are the same.

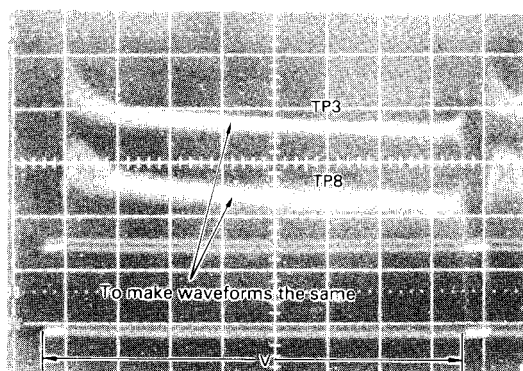


Fig. 41

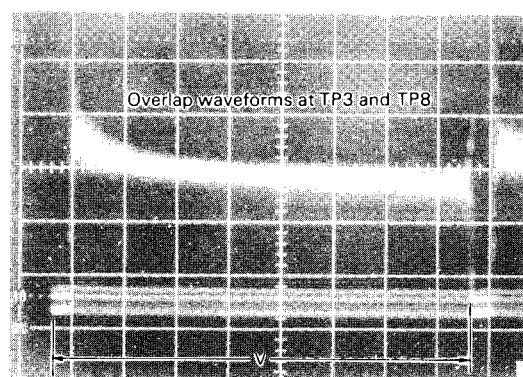


Fig. 42

17'. Blue/modulation shading adjustment

TP3, TP7: Video board

RV205, 208, 211, 214: Deflection board

- 1) Perform adjustment shown in 2 ~ 4, item 15'.

Note: When the iris control has not been changed, the above adjustment is not required.

- 2) Connect one channel of the oscilloscope to TP3 (YL) on the video board and the other to TP7 (B).

- 3) Set the input range of the oscilloscope to 10mV/div (10:1 probe used) for both channels and set to the DUAL mode.

- 4) Adjust RV205, 208 so that the waveforms at TP3 and TP7 are the same. Overlap the two waveforms after adjustment to check that they are the same.

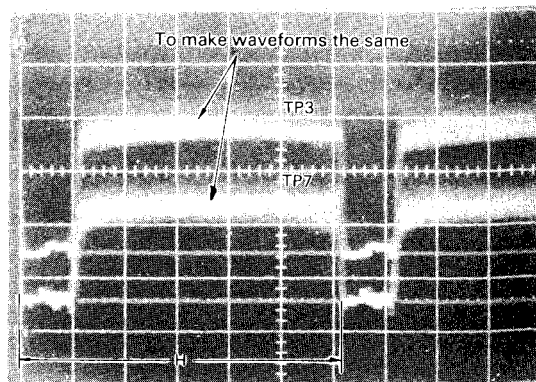


Fig. 43

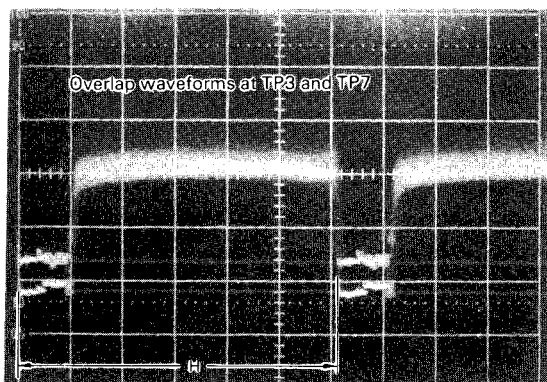


Fig. 44

- 5) Set the oscilloscope to the V period.
- 6) Adjust RV211, 214 so that the waveforms at TP3 and TP7 are the same. Overlap the two waveforms after adjustment to check that they are the same.

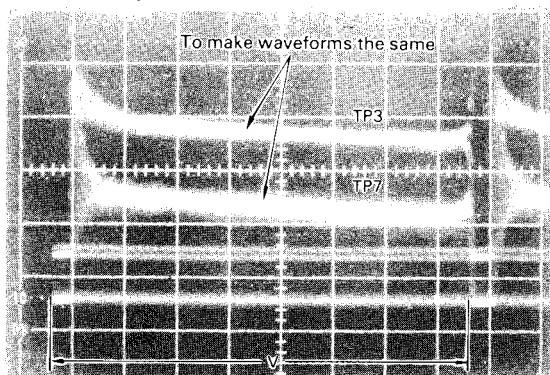


Fig. 45

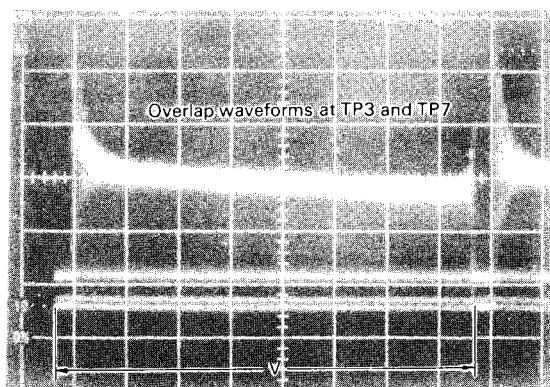


Fig. 46

18. **Set the iris control to its click position**
Return the iris control to its click position.

19. White balance adjustment (II)

TP6: Video board

RV902, 905: Chroma board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot the gray scale chart.
- 3) Alternately adjust RV902 and RV905 to minimize the carrier at 6th ~ 8th steps from the bottom of the staircase waveform.

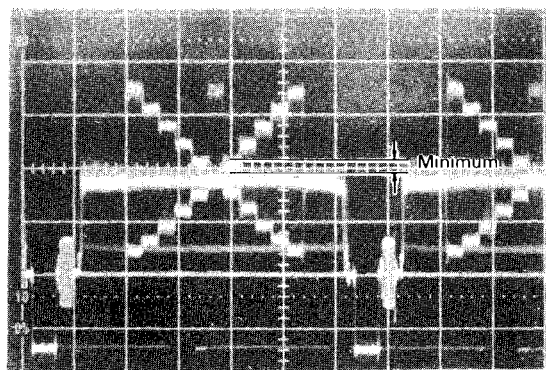


Fig. 47

* Difference between white balance adjustment (I) and (II).

Adjustment (I) is the temporary adjustment to perform shading adjustment and adjustment (II) is the real adjustment done after shading is minimized.

20. DE- γ (Degamma) ADJUSTMENT

TP6: Video board

RV220 ~ 223: Deflection board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot the gray scale chart
- 3) Alternately adjust RV220 and RV223 to minimize the carrier in the white section (10th ~ 11th steps from the bottom) of the staircase waveform.

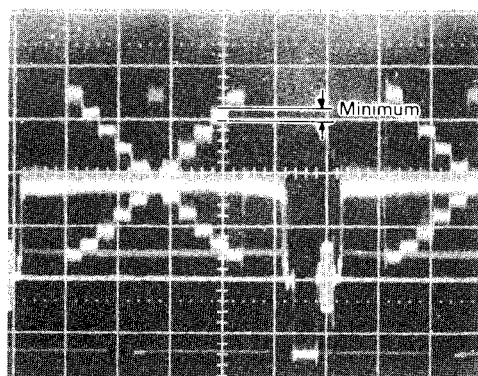


Fig. 48

21. Red phase adjustment

RV10: Video board

- 1) Shoot the color bar chart.
- 2) Adjust RV10 so that the tint of both the TV screen chart and the color bar chart match as much as possible.

22. Chroma gain, burst level adjustment

TP6: Video board

RV7, 8: Video board

Iris control: Back of camera

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot the color bar chart.
- 3) Set the white level of the video signal color bar to 1.3 Vp-p using the iris control.
- 4) Adjust RV8 to set the red carrier level of the waveform to $0.84 \text{ Vp-p} \pm 0.04 \text{ V}$.

- 5) Return the iris control to its click position.
- 6) Adjust RV7 to set the burst level to $0.63 \text{ Vp-p} \pm 0.04\text{V}$.

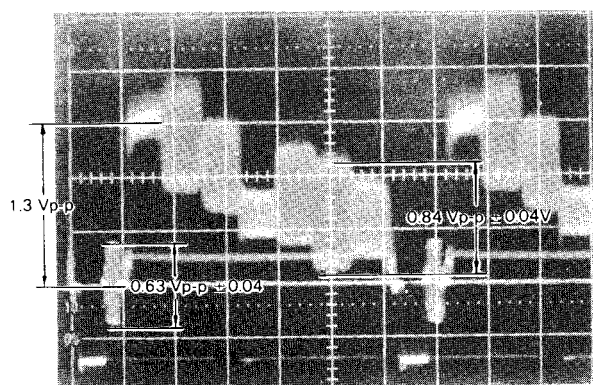


Fig. 49

23. Smear adjustment

TP6: Video board

CV401: Preamplifier board

This adjustment is performed only when color smear is present. Readjust Chroma carrier level, Black balance, White balance (I) and De- γ (Degamma) again when smear has been adjusted.

- 1) Shoot the gray scale.
- 2) Adjust CV401 so that color smear does not occur on the right of the white section of the gray scale on the TV screen.

2. ADJUSTMENT AFTER REPLACING VIDEO CIRCUIT BOARD

1. Bias light adjustment

RV9: Video board

TP1: Video board

- 1) Fit the lens cap.
- 2) Set the oscilloscope to 1:1 and connect it to TP1 on the video board via a resistor ($4.7\text{k}\Omega \sim 10\text{k}\Omega$).
* When the probe is held near the tip, noise is picked up.

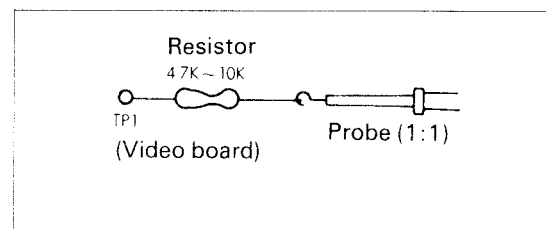


Fig. 51

- 3) Adjust RV9 so that the level at the waveform center is $5\text{mVp-p} \pm 1\text{mV}$.

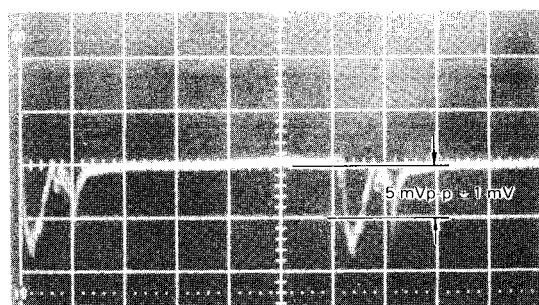


Fig. 52

2. Pulse canceller adjustment

RV1, 5: Video board

Iris control: Back of camera

TP6: Video board

- 1) Fit the lens cap.
- 2) Connect an oscilloscope to TP6 on the video board.
- 3) Adjust RV1 so that setup is 0.4V.
- 4) Adjust RV5 so that the setup level of the waveform does not change when the iris control is alternately moved from fully open to fully closed.

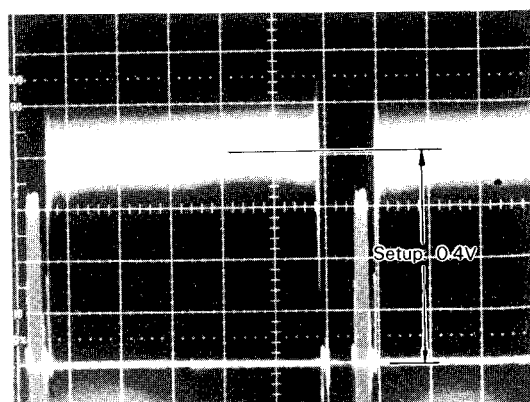


Fig. 53

3. Y setup adjustment

RV1: Video board

TP6: Video board

- 1) Fit the lens cap.
- 2) Connect an oscilloscope to TP6 on the video board.
- 3) Adjust RV1 so that the setup level is $60 \text{ mVp-p} \pm 40 \text{ mV}$.

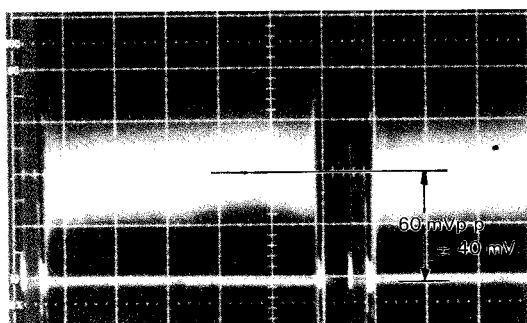


Fig. 54

4. Edge balance adjustment

RV6: Video board

TP6, TP2: Video board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot a gray scale chart.
- 3) Connect the oscilloscope to TP2 on the video board.
- 4) Set the input range of the oscilloscope to 10 mV/div ($10:1$ probe used).
- 5) Adjust RV6 so that the waveform (video signal) is minimized.

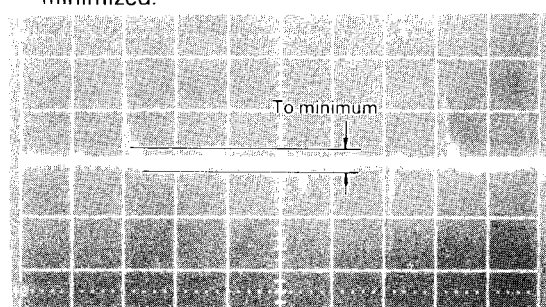


Fig. 55

5. Video level adjustment

RV203: Video board

TP6: Video board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot the gray scale chart.
- 3) Adjust RV203 so that the video signal component of the waveform is $1.5 \text{ Vp-p} \pm 0.06 \text{ V}$.

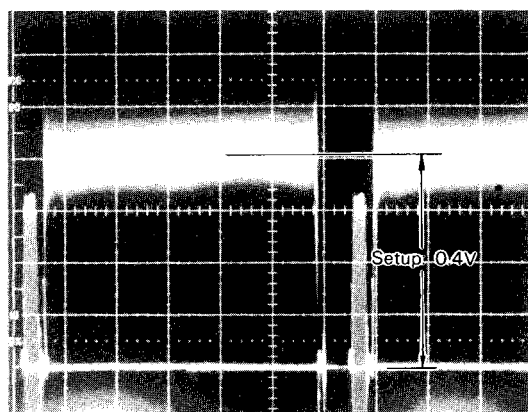


Fig. 56

6. Chroma carrier level adjustment

RV903: Chroma board

RV220, 222: Deflection board

TP901: Chroma board

- 1) Turn RV220, RV222 fully counterclockwise.
- 2) Connect an oscilloscope to TP901 on the chroma board.
- 3) Shoot the gray scale chart.
- 4) Adjust RV903 so that the waveform level is $1.5 \text{ Vp-p} \pm 0.5 \text{ V}$.
 - * Use the oscilloscope with the probe set to $1:1$. Otherwise, the black portion (1st ~ 4th steps from the bottom) of the waveform is distorted.

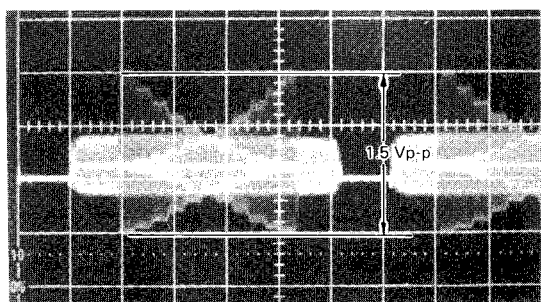


Fig. 57

7. Color separation adjustment

TP901: Chroma board

RV901, 904: Chroma board

- 1) Connect an oscilloscope to TP901 on the chroma board.
- 2) Shoot the color bar chart.
- 3) Alternately adjust RV901 and RV904 to minimize the yellow level of the color bar chart.

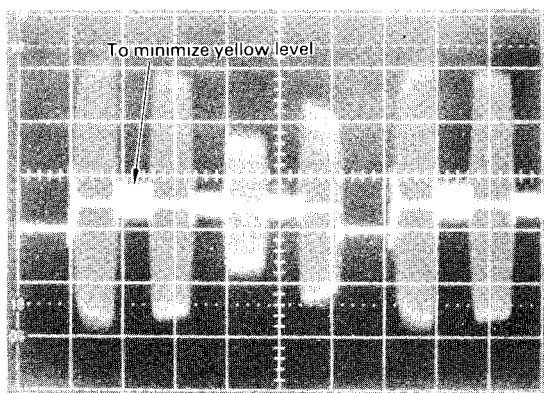


Fig. 58

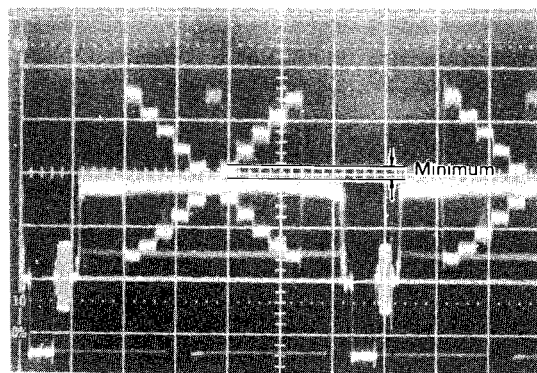


Fig. 60

8. Black balance adjustment

TP6, TP3: Video board

RV2, 3, 4: Video board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot the gray scale chart.
- 3) Turn RV4 fully counterclockwise.
- 4) Alternately adjust RV2 and RV3 to minimize the carrier at the 2nd and 3rd steps from the bottom of the staircase wave.
- 5) Connect the oscilloscope to TP3 on the video board.
(The burst signal and sync signal are not contained in the TP3 waveform)
- 6) Adjust RV4 so that the bottom level of the staircase waveform is $40 \text{ mVp-p} \pm 10 \text{ mV}$.

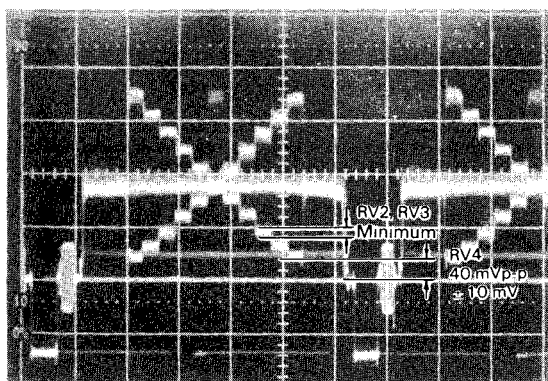


Fig. 59

9. White balance adjustment (I)

TP6: Video board

RV902, 905: Deflection board

RV220, 222: Deflection board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Turn RV220, 222 fully counterclockwise.
(When it is left as it is set in item 6, this item is not required).
- 3) Shoot the gray scale chart.
- 4) Alternately adjust RV902 and RV905 to minimize the carrier at 6th ~ 8th steps from the bottom of the staircase waveform.

10. De-γ (Degamma) adjustment

TP6: Video board

RV220 ~ 223: Deflection board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot the gray scale chart.
- 3) Alternately adjust RV220 and RV223 to minimize the carrier in the white section (10th ~ 11th steps from the bottom) of the staircase waveform.

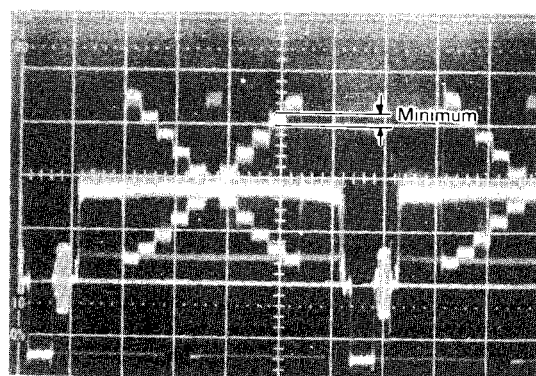


Fig. 61

11. Red phase adjustment

RV10: Video board

- 1) Shoot the color bar chart.
- 2) Adjust RV10 so that the tint of both the TV screen chart and the color bar chart match as much as possible.

12. Chroma gain, burst level adjustment

TP6: Video board

RV7, 8: Video board

Iris control: Back of camera

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot the color bar chart.
- 3) Set the white level of the video signal color bar to 1.3 Vp-p using the iris control.
- 4) Adjust RV8 to set the red carrier level of the waveform to $0.84 \text{ Vp-p} \pm 0.04\text{V}$.
- 5) Return the iris control to its click position.
- 6) Adjust RV7 to set the burst level to $0.63 \text{ Vp-p} \pm 0.04\text{V}$.

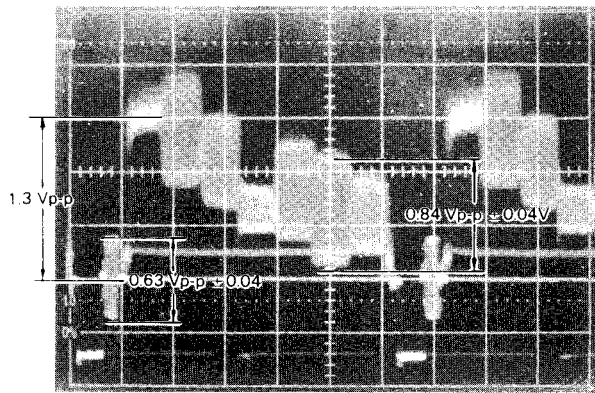


Fig. 62

Perform the adjustment shown in 2 items below when it is required after checking.

13. Level indicator adjustment

- When the gray scale chart is shot, an oscilloscope is connected to TP6 on the video board and the video level is reduced to $0.88 \text{ Vp-p} \pm 0.2\text{V}$ by the iris control but the "L" indicator does not light;

Iris control: Back of camera

RV12 : Video board

TP6 : Video board

- 1) Shoot the gray scale chart.
- 2) Connect the oscilloscope to TP6 on the video board.
- 3) Adjust the iris control so that the video signal is $0.88 \text{ Vp-p} \pm 0.2\text{V}$.

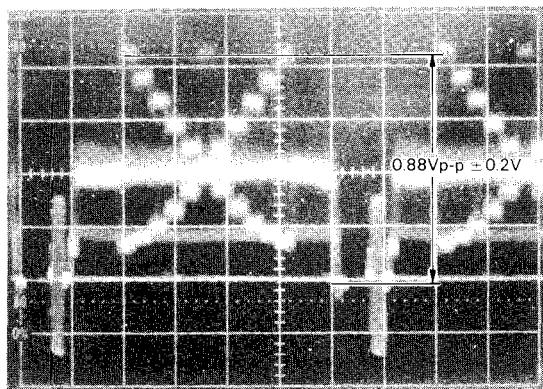


Fig. 63

- 4) Adjust RV12 so that the "L" indicator goes out.

14. White balance indicator adjustment

- When the gray scale is shot, the white balance select switch is set to $\odot$ and white balance check is done with the white balance control set to the click position but the "W" indicator lights red or green;

Note: Both red and green indicators light during the power save mode.

RV11: Video board

- 1) Shoot the gray scale chart.
- 2) Set the white balance control to its click position and press it continuously.
- 3) Adjust RV11 to set to the center point of the range in which the "W" indicator goes out.

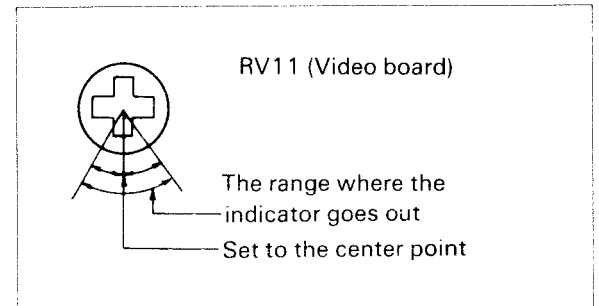


Fig. 64

3. ADJUSTMENT AFTER REPLACING DEFLECTION CIRCUIT BOARD

1. Beam voltage adjustment

RV202: Deflection board

(RV201, 216, 217, 218, 219, LV201: Deflection board)

TP6, TP1: Video board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot the test chart A.
- 3) Turn RV202 clockwise to make the picture appear when the picture does not appear on the TV screen.
- 4) Bring the picture into focus while observing the TV screen.

Adjust RV201 to bring the picture into focus.

* Item 5 is not required when the circle of the chart appears round while observing the TV screen.

- 5) When the circle of the chart is not round on the TV screen, adjust the control VRs shown below so that it is made round and the size roughly matches.

RV216: Horizontal linearity

RV217: Horizontal centering

LV201: Horizontal size (WIDE)

RV218: Vertical size (HEIGHT)

RV219: Vertical centering

- 6) Connect an oscilloscope to TP1 on the video board.

- 7) Shoot the chart as shown in Fig. 70.

Set the zoom to the same position as that when the test chart A is shot in item 2.

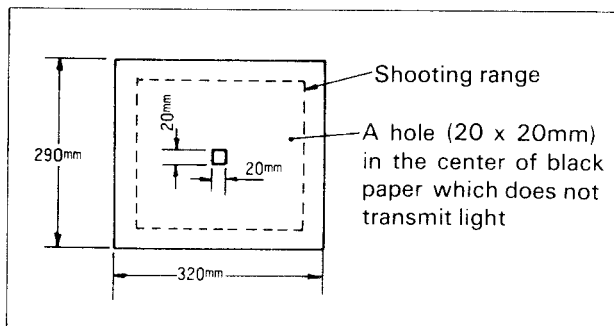


Fig. 70

- 8) Adjust RV202 so that the click level of the beam is $0.32 V_{p-p} \pm 0.02V$.

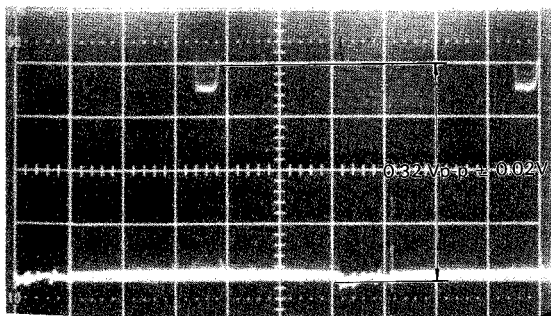


Fig. 71

When the left and right click levels of the waveform differ, match them to the average of both levels. When a carrier is present above the level, adjust the level with the carrier removed.

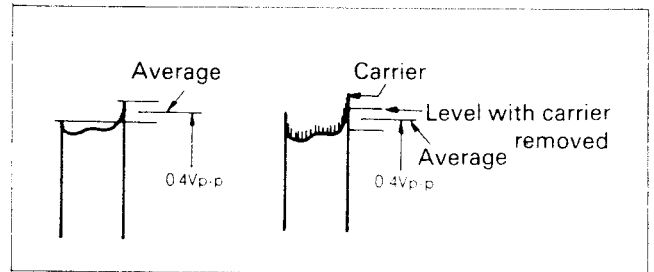


Fig. 72

2. Horizontal size/linearity adjustment

RV216, 217, LV201: Deflection board

TP6: Video board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot a white chart and set the zoom to TELEPHOTO.
- 3) Turn LV201 to shorten the waveform width and make optical black appear a little to the left and right.

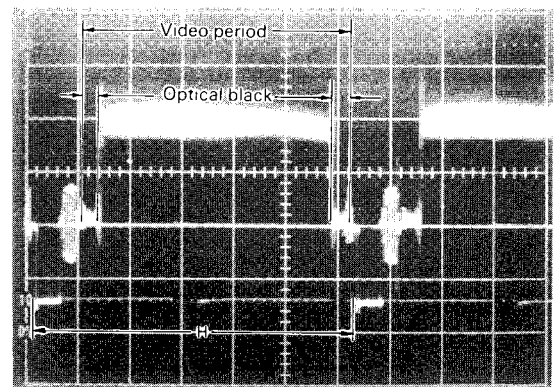


Fig. 73

- 4) Adjust RV217 so that the left and right optical black is symmetrical.
- 5) Shoot the test chart A.
- 6) Adjust RV216 so that the circle on the TV screen is symmetrical to the left and right.
- 7) Shoot a white chart and set the zoom to TELEPHOTO.
- 8) Adjust LV201 so that the optical black mask remains a little on the left and right. Fine adjust RV217 at this time so that the optical black mask is symmetrical on the left and right.

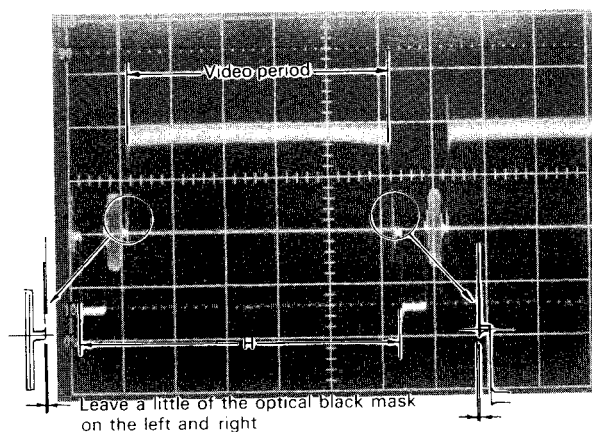


Fig. 74

3. Vertical size/centering adjustment

RV218, 219: Deflection board

TP6, TP1 : Video board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot the white chart and set the zoom to TELE-PHOTO.
- 3) Set the oscilloscope to the V period.
- 4) Turn RV218 to shorten the wave width and make black mask appear a little on the left and right.

* The black mask is seen as a green horizontal bar on the TV screen.

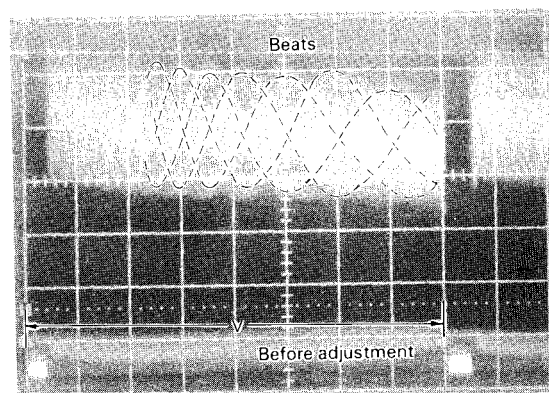


Fig. 76

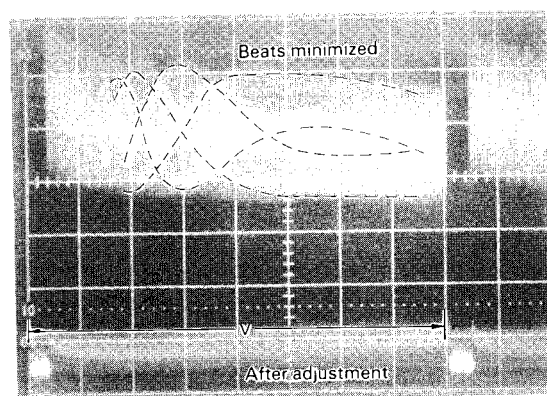


Fig. 77

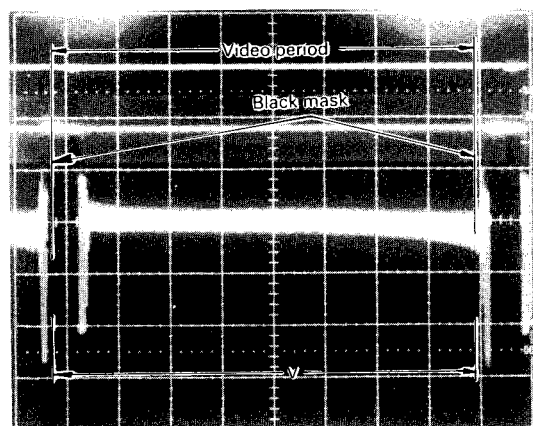


Fig. 75

4. Video level adjustment

RV203: Video board

TP6: Video board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot the gray scale chart.
- 3) Adjust RV203 so that the video signal component of the waveform is $1.5 \text{ V}_{p-p} \pm 0.06 \text{ V}$.

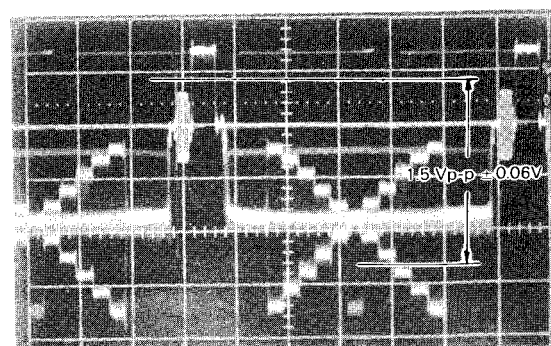


Fig. 78

- 5) Adjust RV219 so that the black mask is symmetrical on the left and right.
- 6) Connect the oscilloscope set to the V period to TP1 on the video board.
- 7) Adjust RV218 so that beats in the waveform are minimum.

* When RV218 is turned, the width increases as beats in the waveform decrease. Adjust finely RV219 so that the black mask is symmetrical on the left and right.

5. Field focus adjustment

RV201, 204 ~ 215: Deflection board

TP201 ~ 203: Deflection board

TP901: Chroma board

- 1) Set RV204 ~ 215 to their mechanical centers. (Or fit the lens cap and set the waveforms at TP201, 202, 203 to minimum)

Use the oscilloscope with the input range set to 5 mV/div (probe 10:1).

TP201 waveform: Minimize using RV204, 207, 210, 213

TP202 waveform: Minimize using RV205, 208, 211, 214

TP203 waveform: Minimize using RV206, 209, 212, 215

- 2) Connect an oscilloscope to TP901 on the chroma board.

- 3) Shoot a white chart and set to TELEPHOTO.

- 4) Adjust RV201 so that the carrier level is max. and the flat range without peaks or troughs is as wide as possible.

* This is to facilitate shading correction later.

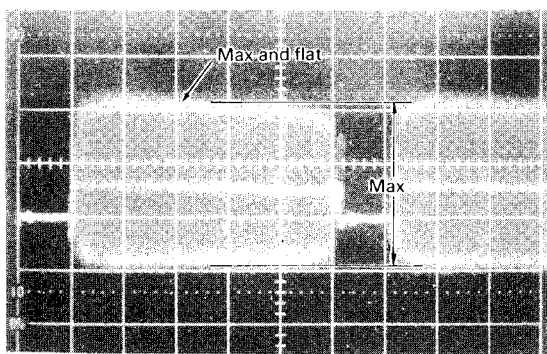


Fig. 79

6. White balance adjustment (I)

TP6: Video board

RV902, 905: Deflection board

RV220, 222: Deflection board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Turn RV220, 222 fully counterclockwise.
- 3) Shoot the gray scale chart.
- 4) Alternately adjust RV902 and RV905 to minimize the carrier at 6th ~ 8th steps from the bottom of the staircase waveform.

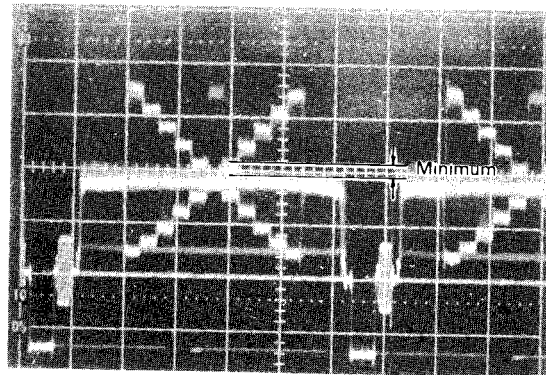


Fig. 80

The adjustment shown in items 7 ~ 8 is the adjustment method applied when an oscilloscope with both the INV (invert) and ADD (addition) functions is used. When the oscilloscope is not provided with either function, perform the adjustment shown in items 7' ~ 8'.

7. Dynamic focus adjustment

(TP201 ~ 203: Deflection board)

TP6: Video board

Iris control: Back of camera

TP3, TP8: Video board

RV204, 207, 210, 213: Deflection board

- 1) Set all RV205, 206, 208, 209, 211, 212, 214, 215 to their mechanical centers or minimize the waveforms at TP202, 203.

(When they are left as set in item 5, the above is not required)

- 2) Connect an oscilloscope to TP6 on the video board.
- 3) Shoot the white chart and set the zoom to TELEPHOTO.
- 4) Adjust the iris control so that the video level is 0.8 Vp-p (Direction to open the iris.)

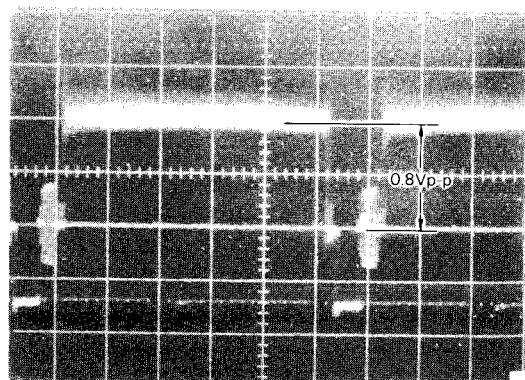
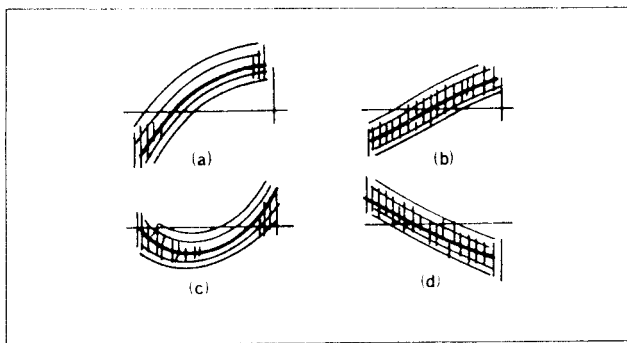


Fig. 81

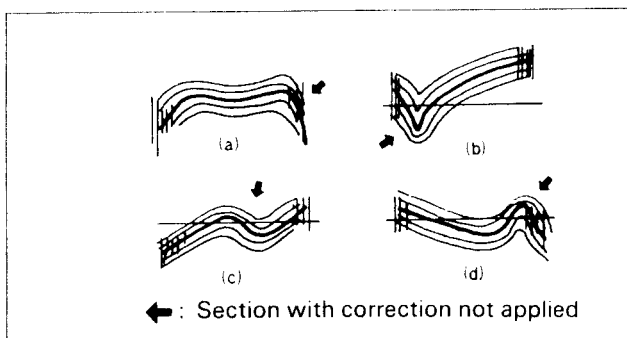
- 5) Connect the channel of the oscilloscope which can be inverted to TP3 (YL) on the video board and set it to the INV mode. Connect TP8 (R) on the video board to other channel.
- 6) Set the input range of the oscilloscope for both channels to 10 mV/div (10:1 probe used) to set to the ADD mode.

- 7) Adjust RV204, 207 to obtain a waveform making it easy to correct shading.



Waveform making it easy to correct shading

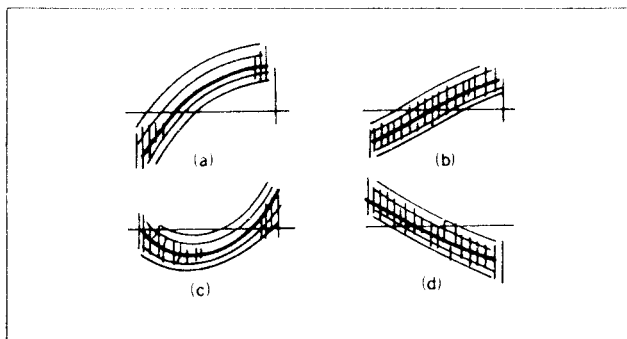
Fig. 82



Waveform making it difficult to correct shading

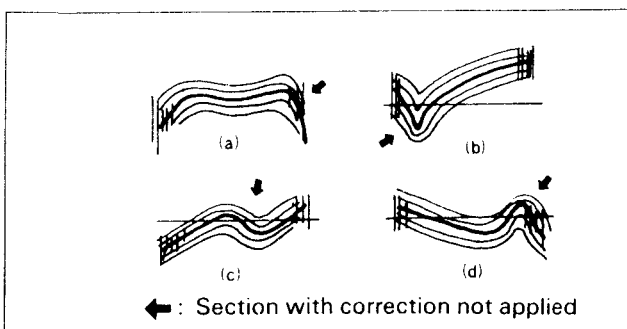
Fig. 83

- 8) Set the oscilloscope to the V period.
9) Adjust RV210, 213 to make the waveform easy to correct shading.



Waveform making it easy to correct shading

Fig. 84



Waveform making it difficult to correct shading

Fig. 85

- 10) When the waveform making it easy to correct shading is not obtained by the above adjustment, adjust the field focus in item 5 and then perform adjustment in 7 ~ 9, item 7 again.

8. Red/modulation shading adjustment

TP3, 8: Video board

RV206, 209, 212, 215: Deflection board

- 1) Perform adjustment shown in 2 ~ 4, item 7.

Note: Readjustment is not required when the iris control has not been changed.

- 2) Connect an oscilloscope as in 5 ~ 6, item 7. Connect TP3 (YL) on the video board to the channel which can be inverted and TP8 (R) to the other channel, and set TP3 to the INV mode and then to the ADD mode.

- 3) Adjust RV206, 209 so that the waveform is as flat as possible.

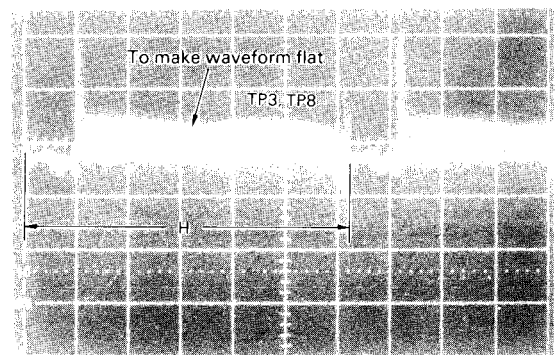


Fig. 86

- 4) Set the oscilloscope to the V period.
5) Adjust RV212, 215 to make the waveform flat.
* Adjust so that the flat section of the waveform fills the video period.

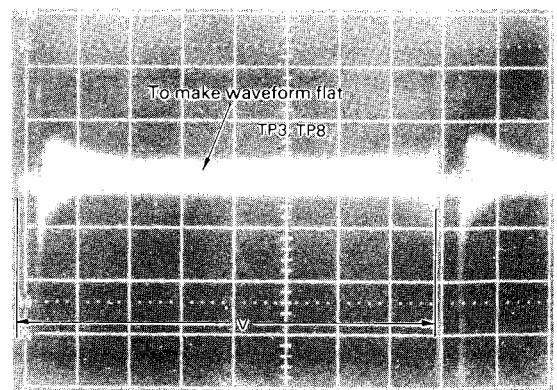


Fig. 87

9. Blue/modulation shading adjustment

TP3, 7: Video board

RV205, 208, 211, 214: Deflection board

1) Perform adjustment shown in 2 ~ 4, item 7.

Note: Readjustment is not required when the iris control has not been changed.

2) Connect the channel of the oscilloscope which can be inverted to TP3 (YL) on the video board and set to the INV mode. Connect the other channel to TP7 (B) on the video board to set to the ADD mode.

Input range: 10 mV/div (10:1 probe used)

3) Adjust RV205, 208 to make the waveform flat.

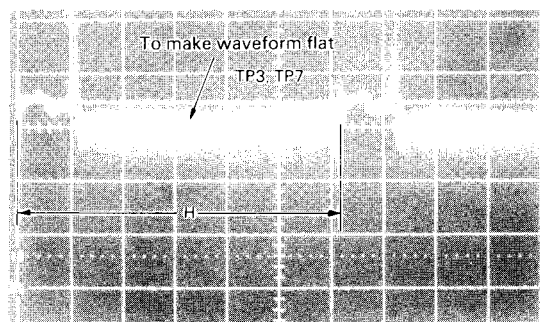


Fig. 88

4) Set the oscilloscope to the V period.

5) Adjust RV212, 214 to make the waveform flat.

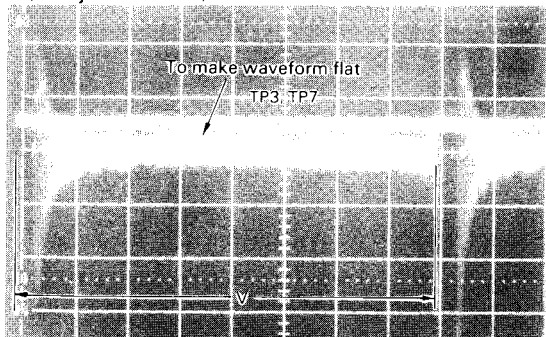


Fig. 89

Adjustment when an oscilloscope which is not provided with either INV or ADD function is used.

7'. Dynamic focus adjustment

(TP201 ~ 203: Deflection board)

TP6: Video board

Iris control: Back of camera

TP3, TP8: Video board

RV204, 207, 210, 213: Deflection board

1) Set all RV205, 206, 208, 209, 211, 212, 214, 215 to their mechanical centers or minimize the waveforms at TP202, 203.

(When they are left as set in item 5, the above is not required)

2) Connect an oscilloscope to TP6 on the video board.

3) Shoot the white chart and set the zoom to TELE-PHOTO.

4) Adjust the iris control so that the video level is 0.8 Vp-p (Direction to open the iris.)

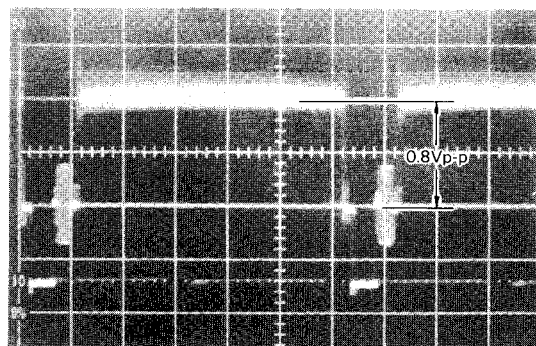
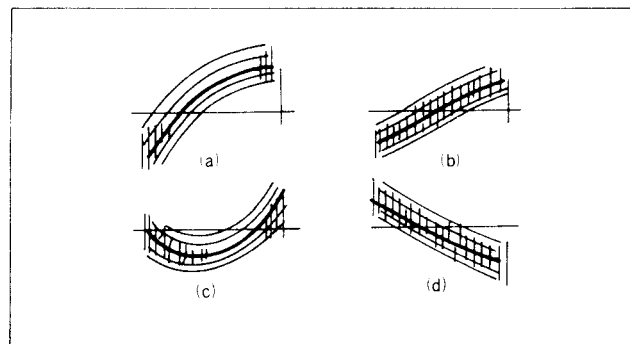


Fig. 90

5) Connect one channel of the oscilloscope to TP3 (YL) on the video board and the other channel to TP8 (R).

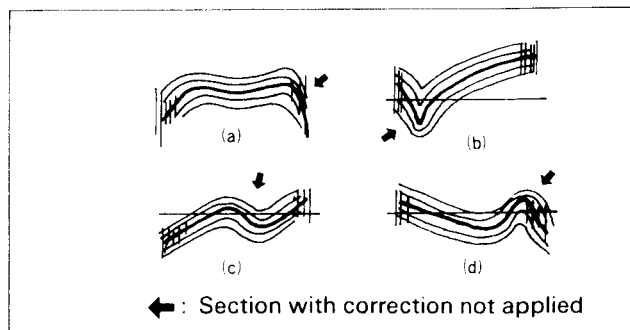
6) Set the input range of the oscilloscope to 10 mV/div (10:1 probe used) for both channels and set to the DUAL mode.

7) Adjust RV204, 207 so that the waveforms at TP3 and TP8 are easy to correct shading.



Waveform making it easy to correct shading

Fig. 91

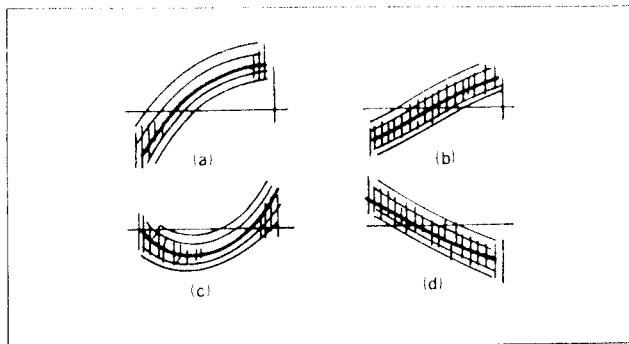


Waveform making it difficult to correct shading

Fig. 92

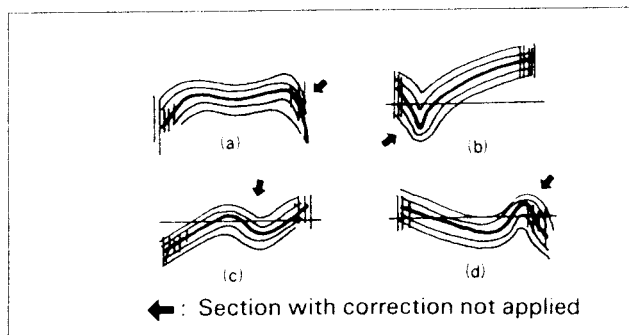
8) Set the oscilloscope to the V period.

9) Adjust RV210, 213 so that the waveforms at TP3 and TP8 are easy to correct shading.



Waveform making it easy to correct shading

Fig. 93



Waveform making it difficult to correct shading

Fig. 94

- 10) When the waveform making it easy to apply shading correction cannot be obtained by the above adjustment, adjust the field focus in item 5, and then perform adjustment in 7 ~ 9, item 7' again.

8'. Red/modulation shading adjustment

TP3, 8: Video board

RV206, 209, 212, 215: Deflection board

- 1) Perform adjustment shown in 2 ~ 4, item 7'.

Note: When the iris control has not been changed, it is not required to readjust.

- 2) Connect the oscilloscope the same as in 5, 6, item 7'. Connect TP3 and TP8 on the video board to the corresponding channels of the oscilloscope.

Set the input level to 10 mV/div (10 : 1 probe used) for both channels.

- 3) Adjust RV206, 209 so that the waveforms at TP3 and TP8 are the same. Overlap the two waveforms after adjustment to check that the two waveforms are the same.

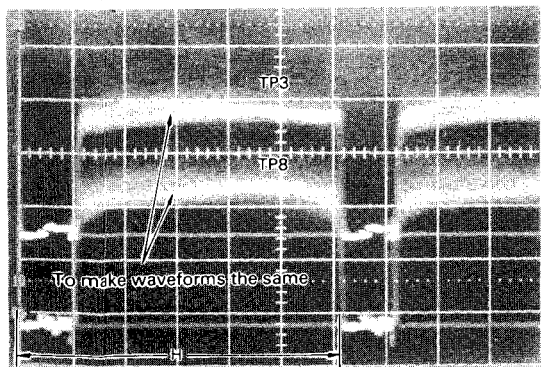


Fig. 95

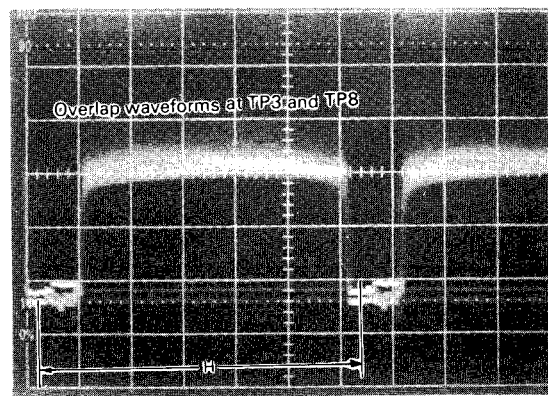


Fig. 96

- 4) Set the oscilloscope to the V period.
- 5) Adjust RV212, 215 so that the waveforms at TP3 and TP8 are the same. Overlap the two waveforms after adjustment to check that the two waveforms are the same.

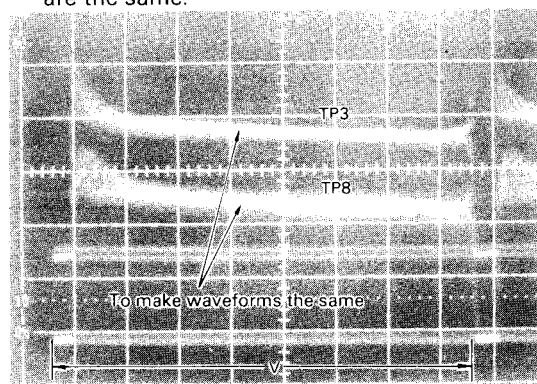


Fig. 97

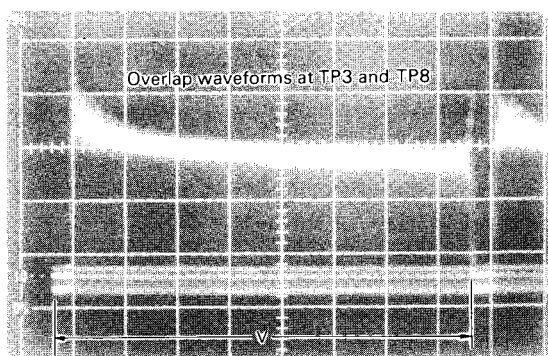


Fig. 98

9'. Blue/modulation shading adjustment

TP3, 7: Video board

RV205, 208, 211, 214: Deflection board

- 1) Perform adjustment in 2 ~ 4, item 7'.

Note: When the iris control has not been changed, the above adjustment is not required.

- 2) Connect one channel of the oscilloscope to TP3 (Y_L) on the video board and the other to TP7 (B).

- 3) Set the input range of the oscilloscope to 10 mV/div (10 : 1 probe used) for both channels and set to the DUAL mode.

- 4) Adjust RV205, 208 so that the waveforms at TP3 and TP7 are the same. Overlap the two waveforms after adjustment to check that they are the same.

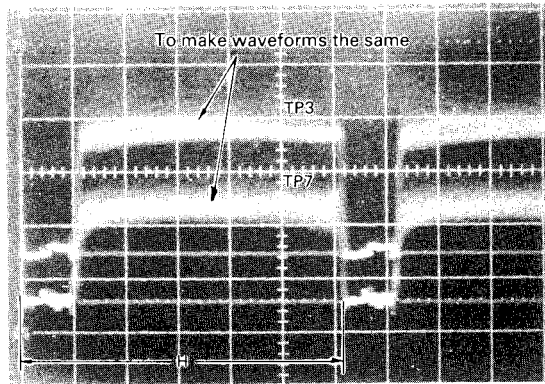


Fig. 99

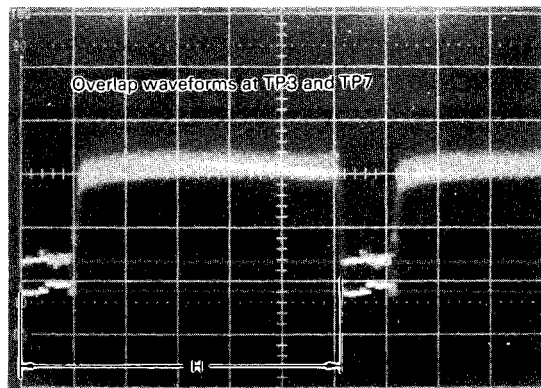


Fig. 100

- 5) Set the oscilloscope to the V period.
- 6) Adjust RV211, 214 so that the waveforms at TP3 and TP7 are the same. Overlap the two waveforms after adjustment to check that the two waveforms are the same.

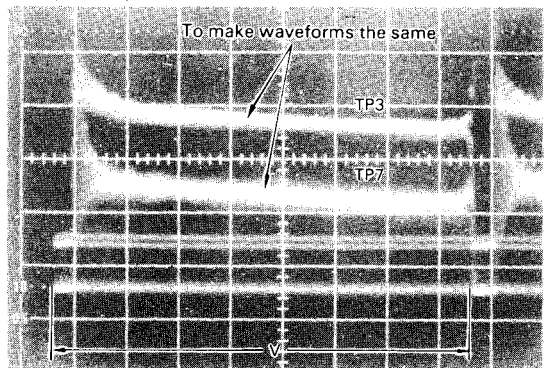


Fig. 101

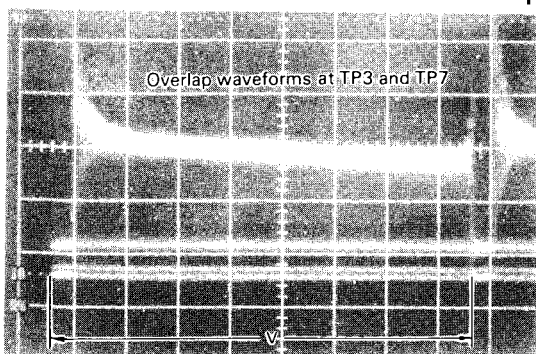


Fig. 102

10. Set the iris control to its click position
Return the iris control to its click position.

11. White balance adjustment (II)

TP6: Video board

RV902, 905: Chroma board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot the gray scale chart.
- 3) Alternately adjust RV902 and RV905 to minimize the carrier at 6th ~ 8th steps from the bottom of the staircase waveform.

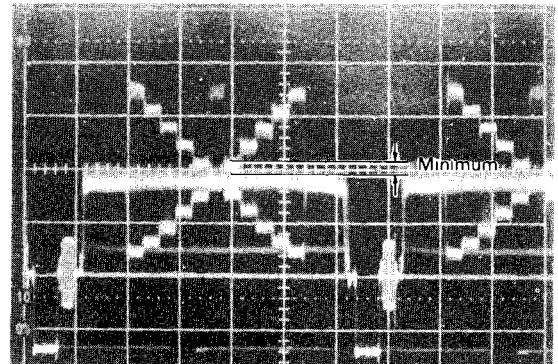


Fig. 103

* Difference between white balance adjustment (I) and (II)

Adjustment (I) is the temporary adjustment to perform shading adjustment and adjustment (II) is the real adjustment done after shading is minimized.

12. De- γ (Degamma) adjustment

TP6: Video board

RV220 ~ 223: Deflection board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot the gray scale chart.
- 3) Alternately adjust RV220 and RV223 to minimize the carrier in the white section (10th ~ 11th steps from the bottom) of the staircase waveform.

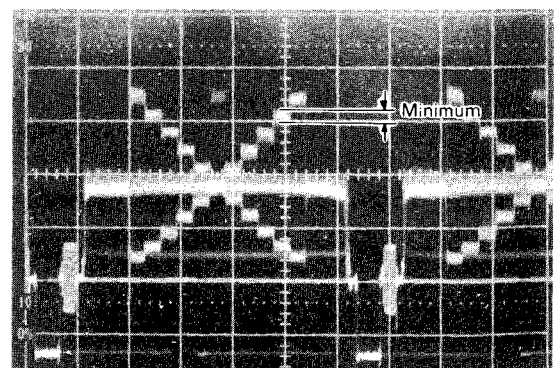


Fig. 104

4. ADJUSTMENT AFTER REPLACING PREAMPLIFIER CIRCUIT BOARD

CV401 on the preamplifier board has been adjusted before shipment, however, if color smears occur after the preamplifier board is replaced, perform the smear adjustment.

After smear adjustment, perform the adjustment shown below.

- Chroma carrier level adjustment
- Black balance adjustment
- White balance adjustment (1)
- De- γ (Degamma) adjustment

Smear adjustment

TP6: Video board

CV401: Preamplifier board

This adjustment is performed only when color smear is present. Readjust Chroma carrier level, Black balance, White balance (I) and De- γ (Degamma) again when smear has been adjusted.

- 1) Shoot the gray scale.
- 2) Adjust CV401 so that color smear does not occur on the right of the white section of the gray scale on the TV screen.

5. ADJUSTMENT AFTER REPLACING REGULATOR CIRCUIT BOARD

RV1101 on the regulator circuit board has been adjusted before shipment, but when the voltage at TP1101 on the regulator board is not set to $9V \pm 0.05V$ after replacement, adjust the power voltage as follows.

Power voltage adjustment

- When the DC voltage at TP1101 on the regulator board is not set to $9V \pm 0.05V$;
 - RV1101: Regulator board
 - TP1101: Regulator board
- 1) Connect a DC voltmeter to TP1101 on the regulator board.
 - 2) Adjust RV1101 so that the voltmeter indicates $9V \pm 0.05V$.

6. FAULTY SHADING ADJUSTMENT

Adjust as follows when shading is faulty.

1. Field focus adjustment

RV201, 204 ~ 215: Deflection board

TP201 ~ 203: Deflection board

TP901: Chroma board

- 1) Set RV204 ~ 215 to their mechanical centers. (Or fit the lens cap and set the waveforms at TP201, 202, 203 to minimum)

Use the oscilloscope with the input range set to 5 mV/div (probe 10:1).

TP201 waveform: Minimize using RV204, 207, 210, 213

TP202 waveform: Minimize using RV205, 208, 211, 214

TP203 waveform: Minimize using RV206, 209, 212, 215

- 2) Connect an oscilloscope to TP901 on the chroma board.
- 3) Shoot a white chart and set to TELEPHOTO.
- 4) Adjust RV201 so that the carrier level is max. and the flat range without peaks or troughs is as wide as possible.

* This is to facilitate shading correction later.

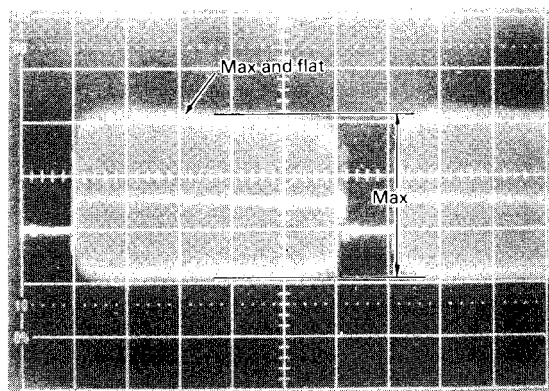


Fig. 111

2. Black balance adjustment

TP6, TP3: Video board

RV2, 3, 4: Video board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot the gray scale chart.
- 3) Turn RV4 fully counterclockwise.
- 4) Alternately adjust RV2 and RV3 to minimize the carrier at the 2nd and 3rd steps from the bottom of the staircase wave.
- 5) Connect the oscilloscope to TP3 on the video board. (The burst signal and sync signal are not contained in the TP3 waveform)
- 6) Adjust RV4 so that the bottom level of the staircase waveform is $40 \text{ mVp-p} \pm 10 \text{ mV}$.

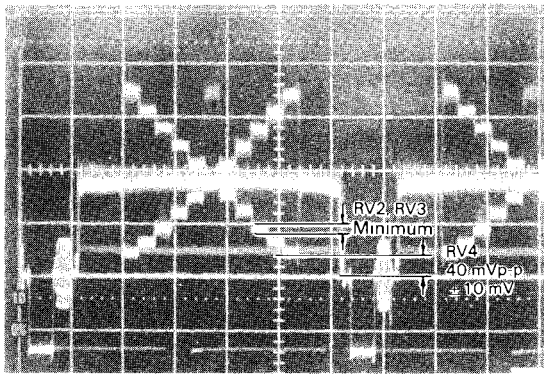


Fig. 112

3. White balance adjustment (I)

TP6: Video board

RV902, 905: Deflection board

RV220, 222: Deflection board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Turn RV220, 222 fully counterclockwise.
- 3) Shoot the gray scale chart.
- 4) Alternately adjust RV902 and RV905 to minimize the carrier at 6th ~ 8th steps from the bottom of the staircase waveform.

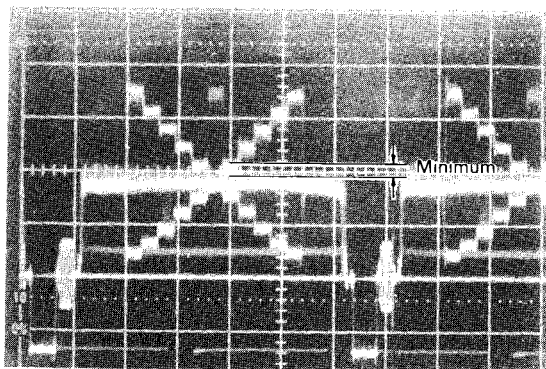


Fig. 113

The adjustment shown in items 4 ~ 6 is the adjustment method applied when an oscilloscope with both the INV (invert) and ADD (addition) functions is used. When the oscilloscope is not provided with either function, perform the adjustment shown in items 4' ~ 6'.

4. Dynamic focus adjustment

(TP201 ~ 203: Deflection board)

TP6: Video board

Iris control: Back of camera

TP3, TP8: Video board

RV204, 207, 210, 213: Deflection board

- 1) Set all RV205, 206, 208, 209, 211, 212, 214, 215 to their mechanical centers or minimize the waveforms at TP202, 203.
(When they are left as set in item 1, the above is not required)

- 2) Connect an oscilloscope to TP6 on the video board.
- 3) Shoot the white chart and set the zoom to TELE-PHOTO.
- 4) Adjust the iris control so that the video level is 0.8 Vp-p (Direction to open the iris.)

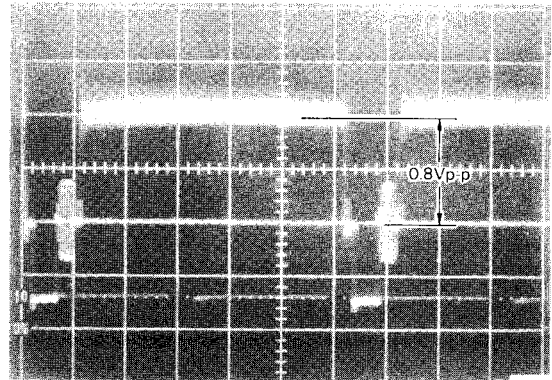
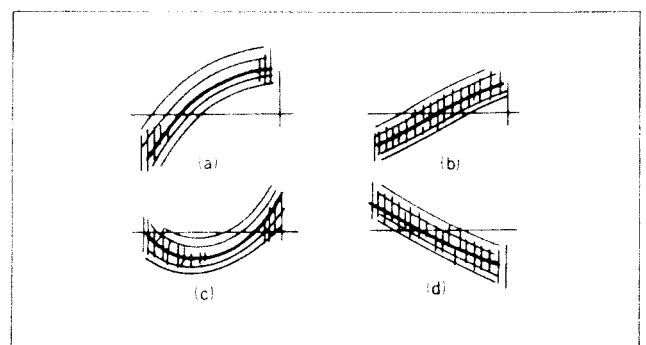


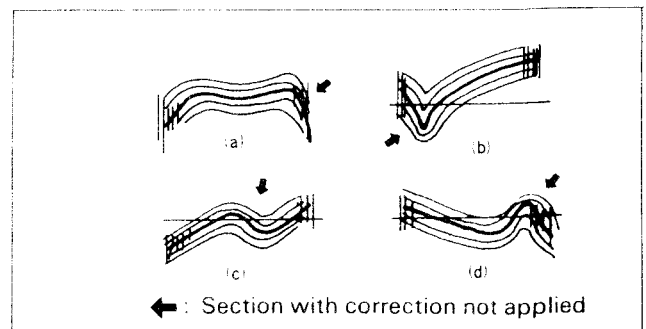
Fig. 114

- 5) Connect the channel of the oscilloscope which can be inverted to TP3 (YL) on the video board and set it to the INV mode. Connect TP8 (R) on the video board to other channel.
- 6) Set the input range of the oscilloscope for both channels to 10 mV/div (10:1 probe used) to set to the ADD mode.
- 7) Adjust RV204, 207 to obtain a waveform making it easy to correct shading.



Waveform making it easy to correct shading

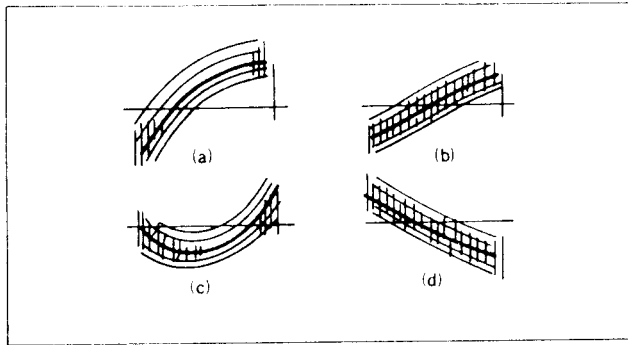
Fig. 115



Waveform making it difficult to correct shading

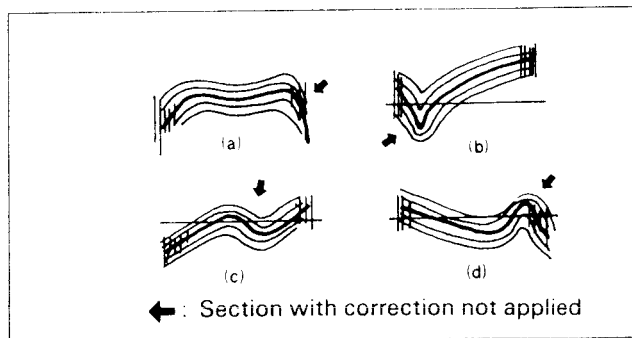
Fig. 116

- 8) Set the oscilloscope to the V period.
- 9) Adjust RV210, 213 to make the waveform easy to correct shading.



Waveform making it easy to correct shading

Fig. 117



Waveform making it difficult to correct shading

Fig. 118

- 10) When the waveform making it easy to correct shading is not obtained by the above adjustment, adjust the field focus in item 1 and then perform adjustment in 7 ~ 9, item 4 again.

5. Red/modulation shading adjustment

TP3, 8: Video board

RV206, 209, 212, 215: Deflection board

- 1) Perform adjustment shown in 2 ~ 4, item 4.
- Note: Readjustment is not required when the iris control has not been changed.
- 2) Connect an oscilloscope as in 5 ~ 6, item 4. Connect TP3 (YL) on the video board to the channel which can be inverted and TP8 (R) to the other channel, and set TP3 to the INV mode and then to the ADD mode.
- 3) Adjust RV206, 209 so that the waveform is as flat as possible.

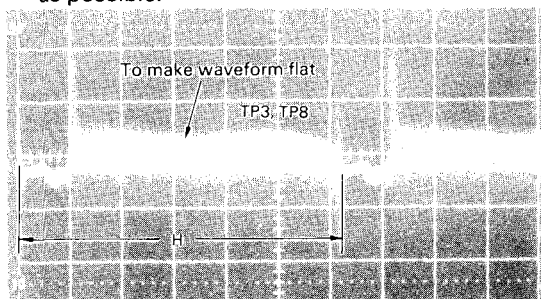


Fig. 119

- 4) Set the oscilloscope to the V period.
- 5) Adjust RV212, 215 to make the waveform flat.
- * Adjust so that the flat section of the waveform fills the video period.

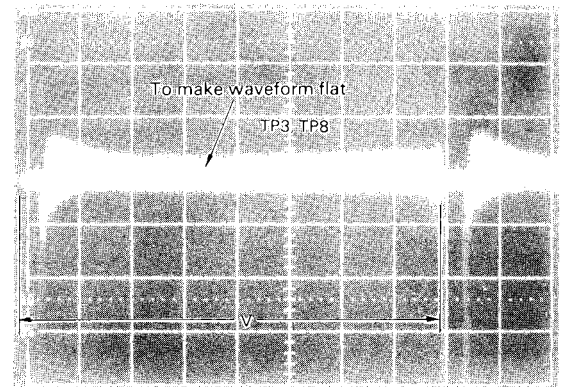


Fig. 120

6. Blue/modulation shading adjustment

TP3, 7: Video board

RV205, 208, 211, 214: Deflection board

- 1) Perform adjustment shown in 2 ~ 4, item 4.
- Note: Readjustment is not required when the iris control has not been changed.
- 2) Connect the channel of the oscilloscope which can be inverted to TP3 (YL) on the video board and set to the INV mode. Connect the other channel to TP7 (B) on the video board to set to the ADD mode.
- Input range: 10 mV/div (10:1 probe used)
- 3) Adjust RV205, 208 to make the waveform flat.

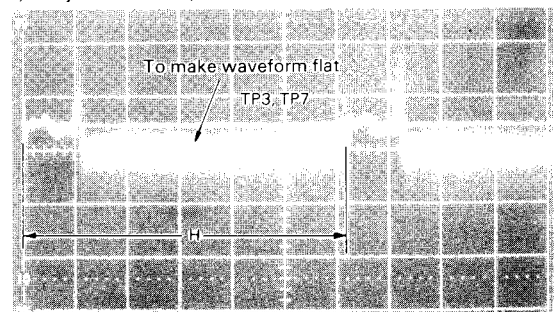


Fig. 121

- 4) Set the oscilloscope to the V period.
- 5) Adjust RV212, 214 to make the waveform flat.

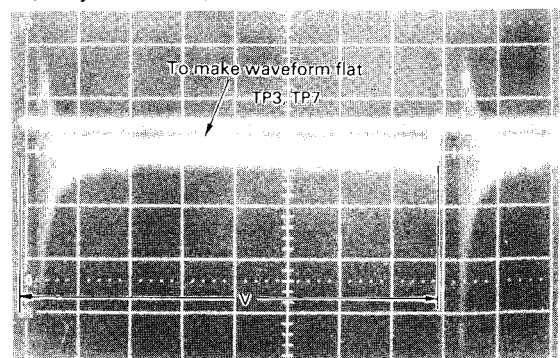


Fig. 122

Adjustment when an oscilloscope which is not provided with either INV or ADD function is used.

4'. Dynamic focus adjustment

(TP202, 203: Deflection board)

TP6: Video board

Iris control: Back of camera

TP3, 8: Video board

RV204, 207, 210, 213: Deflection board

- 1) Set all RV205, 206, 208, 209, 211, 212, 214, 215 to their mechanical centers or minimize the waveforms at TP202, 203.

(When they are left as set in item 1, the above is not required)

- 2) Shoot the white chart and zoom to TELEPHOTO.
- 3) Connect the oscilloscope to TP6 on the video board.
- 4) Adjust the iris control so that the video level is 0.8 Vp-p.
(Direction to open the iris)

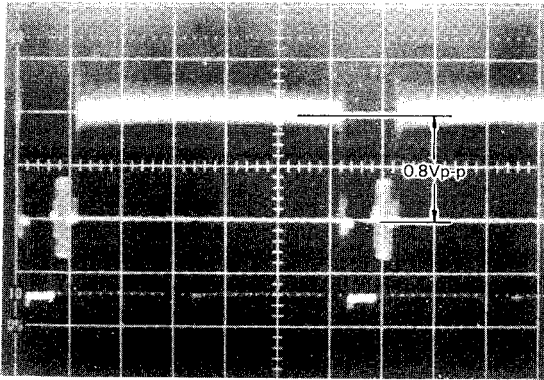
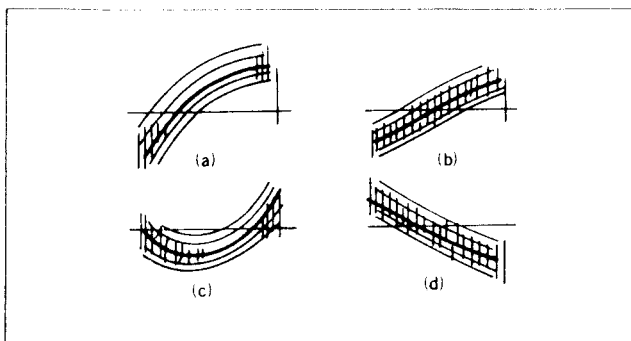


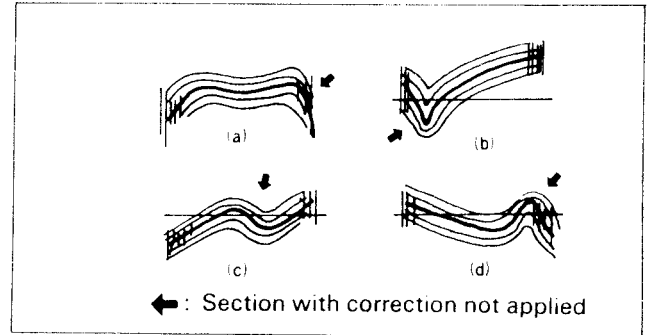
Fig. 123

- 5) Connect one channel of the oscilloscope to TP3 (YL) on the video board and the other channel to TP8 (R)
- 6) Set the input range of the oscilloscope to 10 mV/div (10:1 probe used) for both channels and set to the DUAL mode.
- 7) Adjust RV204, 207 so that the waveforms at TP3 and TP8 are easy to correct shading.



Waveform making it easy to correct shading

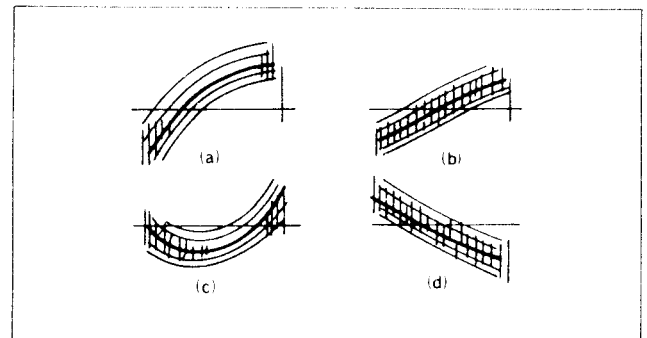
Fig. 124



Waveform making it difficult to correct shading

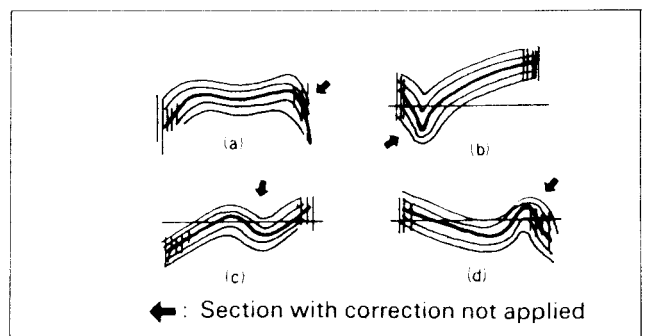
Fig. 125

- 8) Set the oscilloscope to the V period.
- 9) Adjust RV210, 213 so that the waveforms at TP3 and TP8 are easy to correct shading.



Waveform making it easy to correct shading

Fig. 126



Waveform making it difficult to correct shading

Fig. 127

- 10) When the waveform making it easy to apply shading correction cannot be obtained by the above adjustment, adjust the field focus in item 1, and then adjust as shown in 7 ~ 9, item 4' again.

5'. Red/modulation shading adjustment

TP3, 8: Video board

RV206, 209, 212, 215: Deflection board

- 1) Perform adjustment shown in 2 ~ 4, item 4'.

Note: When the iris control has not been changed, it is not required to readjust.

- 2) Connect the oscilloscope the same as in 5, 6, item 4'. Connect TP3 and TP8 on the video board to the corresponding channels of the oscilloscope. Set the input level to 10 mV/div (10:1 probe used) for both channels.

- 3) Adjust RV206, 209 so that the waveforms at TP3 and TP8 are the same. Overlap the waveforms after adjustment to check that the two waveforms are the same.

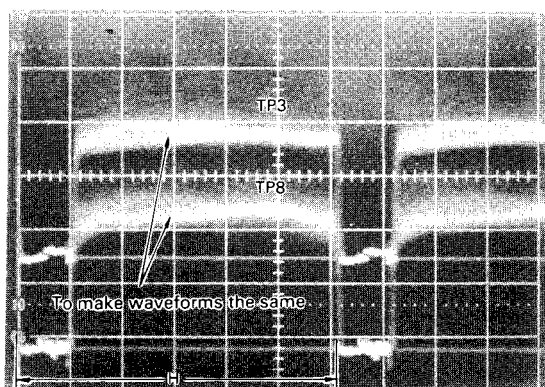


Fig. 128

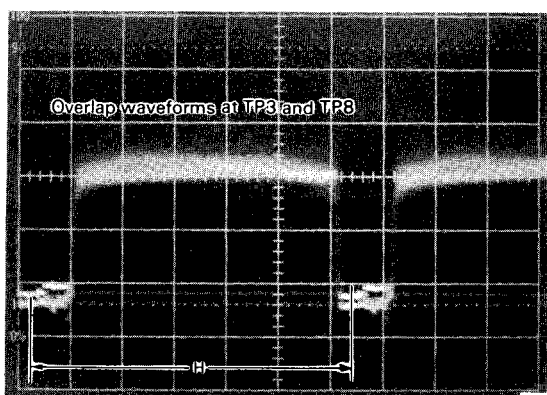


Fig. 129

- 4) Set the oscilloscope to the V period.
- 5) Adjust RV212, 215 so that the waveforms at TP3 and TP8 are the same. Overlap the two waveforms after adjustment to check that the two waveforms are the same.

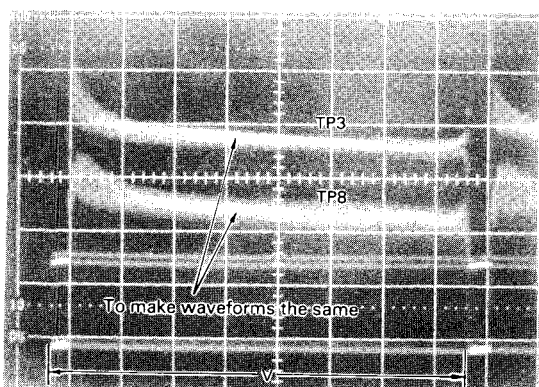


Fig. 130

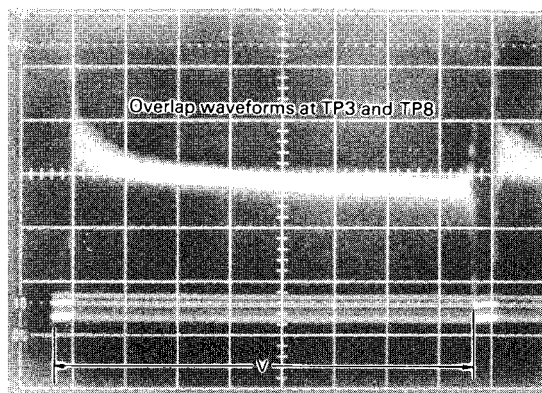


Fig. 131

6'. Blue/modulation shading adjustment

TP3, 7: Video board

RV205, 208, 211, 214: Deflection board

- 1) Perform adjustment shown in 2 ~ 4, item 4'.
- Note: When the iris control has not been changed, the above adjustment is not required.
- 2) Connect one channel of the oscilloscope to TP3 (YL) on the video board and the other to TP7 (B).
- 3) Set the input range of the oscilloscope to 10mV/div (10:1 probe used) for both channels and set to the DUAL mode.
- 4) Adjust RV205, 208 so that the waveforms at TP3 and TP7 are the same. Overlap the two waveforms after adjustment to check that they are the same.

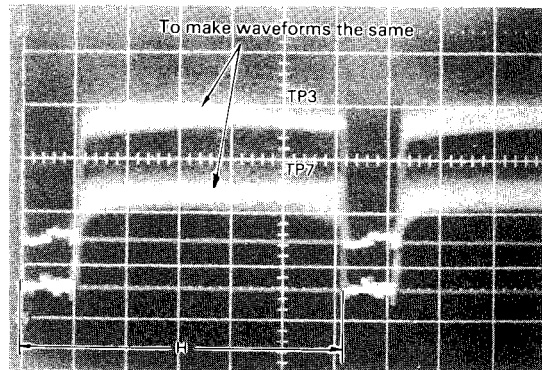


Fig. 132

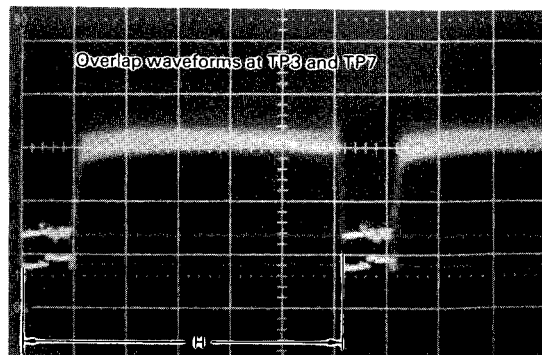


Fig. 133

- 5) Set the oscilloscope to the V period.
- 6) Adjust RV211, 214 so that the waveforms at TP3 and TP7 are the same. Overlap the two waveforms after adjustment to check that they are the same.

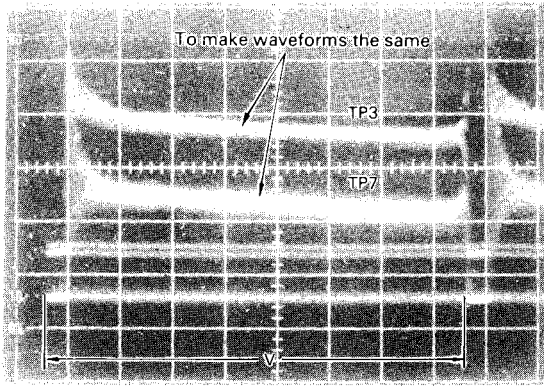


Fig. 134

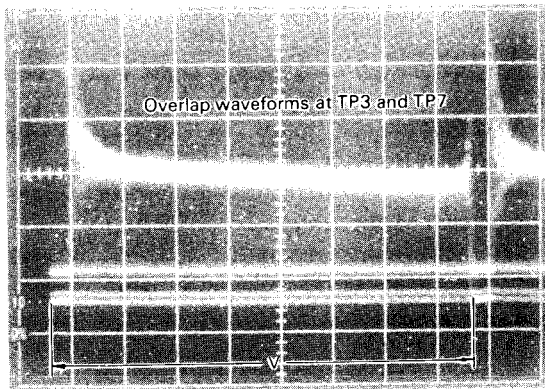


Fig. 135

7. **Set the iris control to its click position**
Return the iris control to its click position.

8. **White balance adjustment (II)**

TP6: Video board
RV902, 905: Chroma board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot the gray scale chart.
- 3) Alternately adjust RV902 and RV905 to minimize the carrier at 6th ~ 8th steps from the bottom of the staircase waveform.

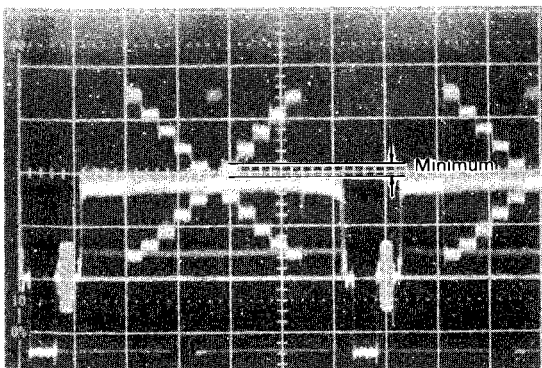


Fig. 136

- * Difference between white balance adjustment (I) and (II)
Adjustment (I) is the temporary adjustment to perform shading adjustment and adjustment (II) is the real adjustment done after shading is minimized.

9. **De- γ (Degamma) adjustment**

TP6: Video board
RV220 ~ 223: Deflection board

- 1) Connect an oscilloscope to TP6 on the video board.
- 2) Shoot the gray scale chart.
- 3) Alternately adjust RV220 and RV223 to minimize the carrier in the white section (10th ~ 11th steps from the bottom) of the staircase waveform.

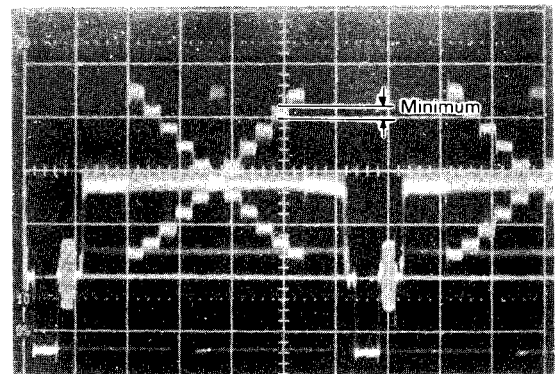


Fig. 137

7. **ELECTRONIC VIEWFINDER ADJUSTMENT**

1. **Vertical size adjustment**

RV505
Adjusts vertical size

2. **Contrast adjustment**

RV501
Adjusts the contrast of the picture so it is easy to see.

3. **Brightness adjustment**

RV502
Adjusts light and darkness of the picture so that it is easy to see.

4. **Horizontal hold adjustment**

RV503
Adjusts horizontal hold

5. **Vertical hold adjustment**

RV504
Adjusts vertical hold

6. **Focus adjustment**

RV506
Adjust focus so that sharpness of the picture is best.

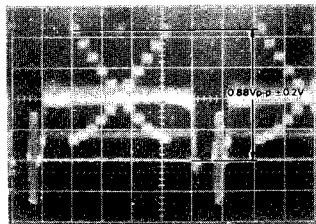
7. **Centering adjustment**

Sets the raster position using the centering magnet attached to the deflection yoke.

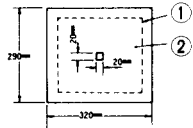
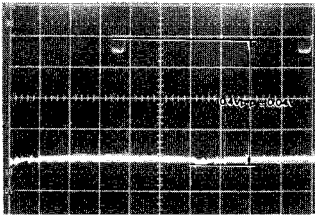
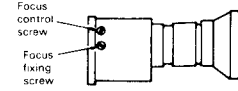
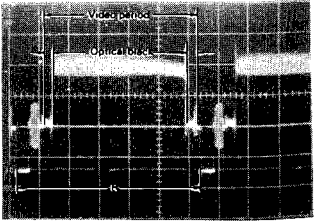
ADJUSTMENT LIST

Purpose of adjustment and picture phenomena are arranged in the order circuit No., purpose of adjustment and picture phenomena.

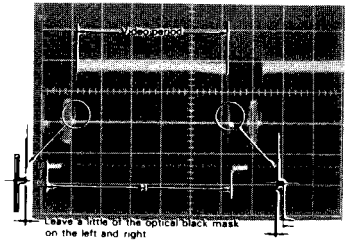
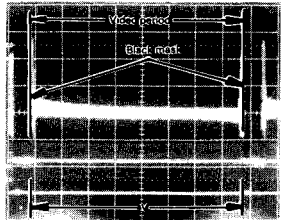
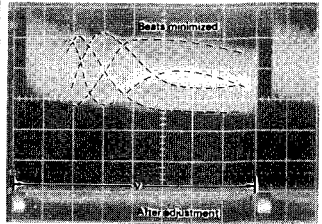
* Adjustment before/after replacing circuit boards.

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
1.	Power voltage adjustment	RV1101 To set camera circuit power voltage	TP1101 Regulator board	RV1101 Regulator board	Adjust indication of the voltmeter using RV1101 to set to $9V \pm 0.05V$
2.	Sub-carrier frequency adjustment	CV801 To adjust the oscillation frequency of the sync signal generating section ● Color flicker, no color, color lock released. Tint drifts or different color appears	TP4 Video board	CV801 SSG board	Adjust counter indication using CV801 to set to $4.43361875 \text{ MHz} \pm 100 \text{ kHz}$
3.	PPL adjustment	VL801 To adjust to provide the interleaved relation between the horizontal sync signal and sub-carrier frequency ● Picture fluctuated, sync distorted, no color, tint greatly drifted, color beats	TP801 SSG board	VL801 SSG board	Adjust indication of the voltmeter using VL801 to set to $3V \pm 0.1V$
4.	Level indicator adjustment	RV12 To adjust point at which the "L" indicator lights showing these is too little light ● "L" indicator does not light when the picture level gets lower, always remaining lit.	TP6 Video board Viewfinder "L" indicator	Iris control at back of camera RV12 Video board	Shoot gray scale chart. Adjust video signal component of waveform and set its level to $0.88V_{p-p}$.  Adjust RV12 so the "L" indicator changes from lit to out.
5.	White balance indicator adjustment	RV11 To adjust so that "W" indicator goes off only when white balance is obtained during white balance check. ● White balance is drifted but "W" indicator goes out.	Viewfinder "W" indicator	RV11 Video board	Shoot gray scale chart. Continuously press white balance control at the click position. Adjust RV11 to set to the middle point within the range where "W" indicator goes out.

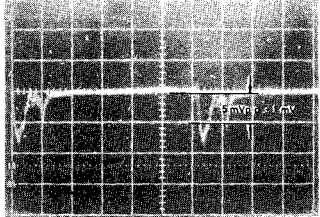
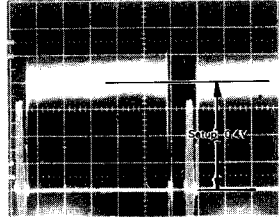
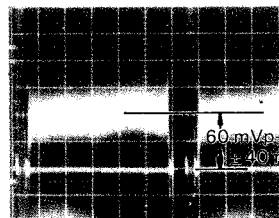
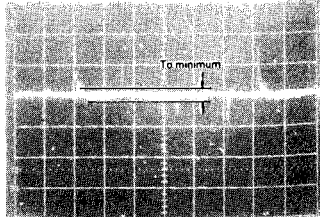
1. Adjustment after replacing camera tube/coil ass'y

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
1.	Beam voltage adjustment	RV202 To adjust electron beam amount of SATICON by varying G1 voltage. - When the voltage is too low: The high bright (white) sections of the gray scale cannot be discriminated. When the voltage is lowered further, picture does not appear. - When the voltage is too high: Magenta ghost appears to the right side of the high bright (white) section of the gray scale. Or, horizontal green color appears in that section. Shading amount increases.	TP6 Video board TV screen	LV201, RV216 ~ 219, deflection board	Shoot the test chart A. Adjust LV201, RV216 ~ 219 when the circle of the chart is not round. This adjustment is not required when the circle is approximately round. Adjust the following: RV217: Horizontal centering LV201: Horizontal size (wide) RV216: Horizontal linearity RV219: Vertical centering RV218: Vertical size (height)
			TP1 Video board	RV202 Deflection board	Shoot the chart shown in the diagram. ① Shooting range ② Provide a hole (20 × 20 mm) at the center of a black paper which does not transmit light.  Adjust the clip level of the waveform using RV202 and set it to $0.32 V_{p-p} \pm 0.02V$. 
2.	Back-focus adjustment	Back-focus adjustment screw - Operate the zoom to TELE and WIDE so that focusing is obtained at both. - Focus is drifted when the zoom is operated.	TV screen	Back-focus adjusting screw	Set the distance between the color viewer and camera to 3m. Shoot the test chart A. 1. Zoom: TELEPHOTO Focusing: Focus of lens 2. Zoom: WIDE Focusing: Focus adjusting screw (with focus adjusting screw loose) Adjust TELEPHOTO and WIDE repeatedly. Check that focus is obtained at both TELEPHOTO and WIDE when the distance 10 m or more is shot with the scale set to "∞". 
3.	Horizontal size/linearity adjustment	LV201 To adjust horizontal deflection size The circle chart is distorted. Color balance is not obtained but changes to green.	TP6 Video board	LV201 Deflection board	Shoot white chart. Zoom: TELEPHOTO Adjust LV201 to shorten the waveform width. 

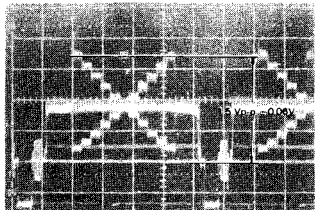
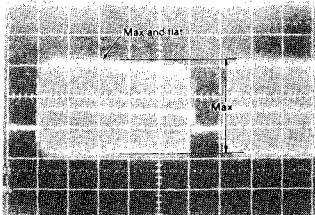
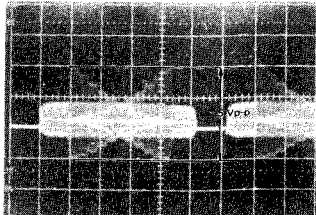
1. Adjustment after replacing camera tube/coil ass'y

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
		RV217 To adjust horizontal deflection position		RV217 Deflection board	Adjust RV217 and set the optical black mask so it is symmetrical on the left and right.
		Black mask appears on the left or right of the screen	TV screen	RV216 Deflection board	Shoot the test chart A. Adjust RV216 so that the circle on the TV screen is symmetrical on the left and right.
		RV216 To adjust horizontal deflection linearity. The circle chart is distorted. Color unevenness appears on the left or right.	TP6 Video board	LV201 (RV217)	Shoot the white chart. Zoom: TELEPHOTO Adjust LV201 so that a little optical black mask remains on the left and right. Fine adjust RV217 so that the optical black mask is symmetrical on the left and right.  Leave a little of the optical black mask on the left and right
4.	Vertical size/centering adjustment	RV218 To adjust vertical deflection size The circle chart is distorted (becomes an ellipse)	TP6 Video board	RV218 Deflection board	Shoot the white chart Zoom: TELEPHOTO Set the oscilloscope to the V period. Adjust RV218 and shorten the waveform width to make the black mask appear on the left and right. 
		RV219 To adjust vertical deflection centering The circle chart is distorted. Green mask appears at the top or bottom of the screen.		RV219 Deflection board	Adjust RV219 so the black mask is symmetrical on the left and right.
			TP1 Video board	RV218 (RV219)	Adjust RV218 to minimize waveform beats. Fine adjust RV219 so that the black mask is symmetrical on the left and right.  Beats minimized After adjustment

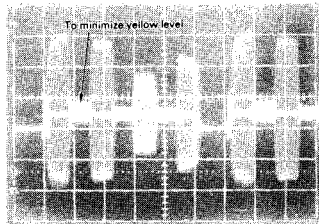
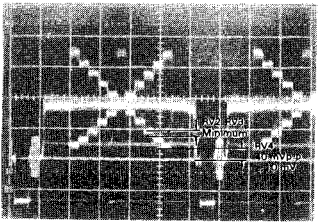
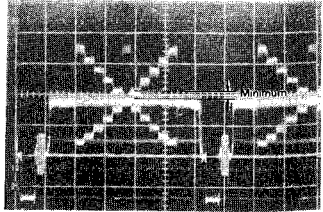
1. Adjustment after replacing camera tube/coil ass'y

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
5.	Bias light adjustment	RV9 To adjust bias light potential When the voltage is too low, residual image (picture is greenish) when brightness increases slightly.	TP1 Video board	RV9 Video board	Fit the lens cap. Set the probe to 1 : 1 and connect to TP1 via a resistor. Adjust the level nearer to the center using RV9 so that it is $5\text{m V}_{p-p} \pm 1\text{ mV}$. 
6.	Pulse canceller adjustment	RV5 To adjust so that the setup does not change when the iris control is varied. The whole picture changes to red or green	TP6 Video board	RV1 Video board RV5 Video board Iris control at back of camera	Fit the lens cap. Temporarily adjust setup using RV1 to set to 0.4 V_{p-p} .  Adjust RV5 so that the waveform level does not change when the iris is moved alternately from fully open to fully closed.
7.	Y setup adjustment	RV1 To adjust setup of the luminance signal. Picture becomes whitish or seems sunk.	TP6 Video board	RV1 Video board	Fit the lens cap. Adjust setup using RV1 to set to $60\text{ mV}_{p-p} \pm 40\text{ mV}$. 
8.	Edge balance adjustment	RV6 To adjust so that only the vertical edge signal is mixed with the luminance signal. The whole screen becomes red or green	TP6 Video board TP2 Video board	RV6 Video board	Shoot the gray scale chart. Set the input range of the oscilloscope to 10 mV/div (probe 10 : 1) Adjust RV6 to minimize the waveform. 

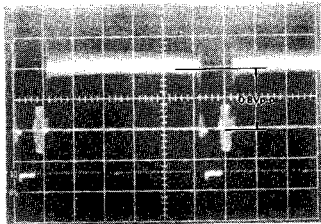
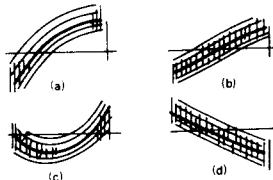
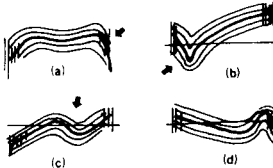
1. Adjustment after replacing camera tube/coil ass'y

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
9.	Video level adjustment	RV203 To set the balance point of the lens automatic iris to keep the video output level constant. ● Illumination is sufficient but the picture is too dark or the picture is too bright and bright sections are saturated.	TP6 Video board	RV203 Deflection board	Shoot the gray scale chart. Adjust the video signal component of the waveform using RV203 and set it to $1.5 V_{p-p} \pm 0.06V$. 
10.	Field focus adjustment	RV201 To adjust the focus electrode voltage of the SATICON so that the electron beam output from the cathode is focused on the photoconductive film. ● Focus is not obtained when the focus ring or the focus adjusting screw of the lens is turned.	TP201 TP202 TP203 Deflection board TP901 Chroma board	RV204, 207, 210, 213 RV205, 208, 211, 214 RV206, 209, 212, 215 Deflection board RV201 Deflection board	Set RV204 ~ 215 to their mechanical centers. * Or, fit the lens cap and minimize the waveforms at TP201 ~ 203. Oscilloscope: 5 mV/div (Probe: 10 : 1) Adjust RV204, 207, 210, 213 so the waveform is flat and level minimum. Adjust RV205, 208, 211, 214 so the waveform is flat and level minimum. Adjust RV206, 209, 212, 215 so the waveform is flat and level minimum. Shoot the white chart. Zoom: TELEPHOTO Adjust RV201 so the carrier level max. and flat without peaks and troughs. 
11.	Chroma carrier level adjustment	RV903 To adjust the carrier level of the chroma signal. ● No color, tint abnormal.	TP901 Chroma board	RV903 Chroma board	Turn RV220, 222 fully counterclockwise. Shoot the gray scale chart. Adjust RV903 to obtain $1.5 V_{p-p} \pm 0.5V$. 

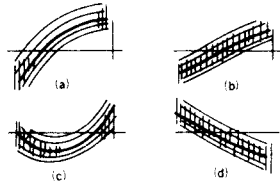
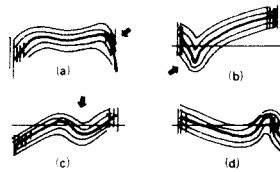
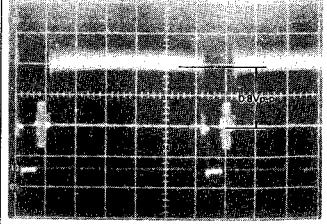
1. Adjustment after replacing camera tube/coil ass'y

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
12.	Color separation adjustment	RV901 To adjust the carrier phase shift angle with the R/B separation circuit. - Color reproduction faulty. Mixed color. RV904 To adjust the 1H delayed carrier level of the chroma signal and match it with the chroma signal carrier level of the phase shifter output. - Color saturation and purity are deteriorated causing mixing of colors.	TP901 Chroma board	RV901, 904 Chroma board	Shoot the color bar chart. Adjust RV901 and RV904 alternately to minimize yellow level of the color bar. 
13.	Black balance adjustment	RV4 To cut the dark portion of the YL signal so the dark portion is not colored. - The dark portion of the picture becomes discolored. RV2 To adjust setup of the YL signal. - The dark portion of the picture is colored green or magenta. RV3 Adjust setup of the B signal. - The dark portion of the picture is colored blue or yellow.	TP6 Video board	RV4 (Video board) RV2, 3 (Video board)	Shoot the gray scale chart. Turn RV4 fully counterclockwise. Adjust RV2 and RV3 alternately to minimize the carrier at the 2nd ~ 3rd steps from the bottom of the staircase wave. 
			TP3 Video board	RV4	Adjust RV4 so that the level at the bottom of the staircase wave is 40 mV _{p-p} ± 10 mV.
14.	White balance adjustment (I)	RV902 To match the YL and B signal levels and adjust so that white balance is obtained. - White balance is not obtained. RV905 To match the YL and R signal levels and adjust so that white balance is obtained. - White balance is not obtained.	TP6 Video board	RV902,905 Chroma board	Turn RV220, 222 fully counterclockwise. Shoot the gray scale chart. Adjust RV902 and RV905 alternately to minimize the carrier at the 6th ~ 8th steps from the bottom of the staircase wave. 

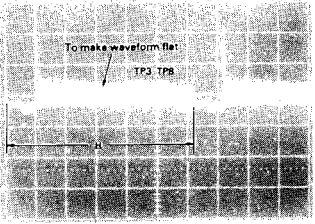
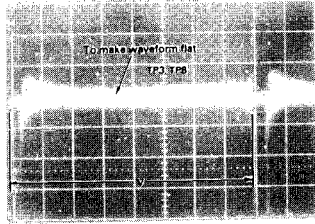
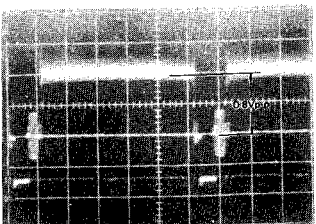
1. Adjustment after replacing camera tube/coil ass'y

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
The following items 15 ~ 17 are the adjustments used when the oscilloscope is provided with both INV (invert) and ADD (addition) functions. Refer to the adjustment method in items 15' ~ 17' when the oscilloscope is not provided with either of the two functions.					
15.	Dynamic focus adjustment	RV204, 207, 210, 213 To correct focusing of peripheral beams of SATICON. To adjust amount of dynamic focus. ● Color unevenness increases.	TP202	RV205, 208, 211, 214	Set RV205, 206, 208, 209, 211, 212, 214, 215 to their mechanical centers. * Or, fit the lens cap and minimize the waveform at TP202, TP203. Adjust RV205, 208, 211, 214 so that the waveform is flat and the level is minimum. Adjust RV206, 209, 212, 215 so that the waveform is flat and the level is minimum. (This item is not required when they are set in item 10.)
			TP203 Deflection board	RV206, 209, 212, 215 Deflection board	
			TP6 Video board	Iris control at back of camera	Shoot the white chart and set zoom to TELEPHOTO. Adjust the video signal component with the iris control to set to 0.8 V _{p-p} . 
			TP3 Video board	RV204, 207 Deflection board	Connect the invertable channel of the oscilloscope and set to the INV mode. Set the input range of both channels of the oscilloscope to 10 mV/div (probe: 10 : 1) to set and the ADD mode. Adjust the waveform using RV204, 207 so that it is easy to correct shading.  Waveform making it easy to correct shading  ✦ : Section without correction applied Waveform making it difficult to correct shading
			TP8 Video board		

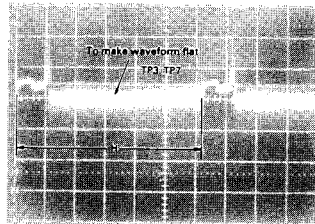
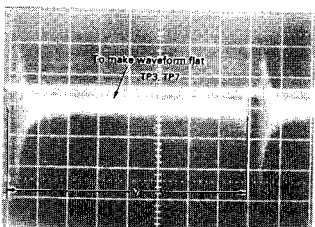
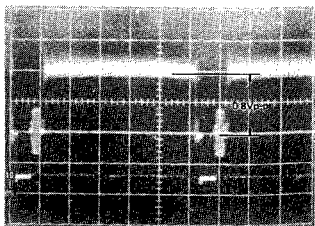
1. Adjustment after replacing camera tube/coil ass'y

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
				RV210, 213 Deflection board	Set the oscilloscope to the V period. Adjust the waveform using RV210, 213 so that it is easy to correct shading.  Waveform making it easy to correct shading  ↔: Section without correction applied Waveform making it difficult to correct shading * When the waveform easy to correct shading is not obtained by the adjustment shown above, adjust the field focus in item 10, and then perform adjustment shown in item 15 again.
16.	Red/ modulation shading adjustment	RV206, 209, 212, 215 To correct R signal color unevenness ● Color unevenness increases	TP6 Video board	Iris control at back of camera	Shoot the white chart and set zoom to TELEPHOTO. Adjust the video signal component using the iris control to set to 0.8 V_{p-p}. * When the iris control has not been changed after adjustment in item 15, adjustment is not required. 

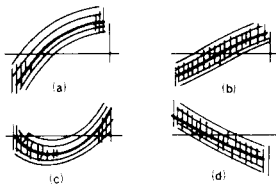
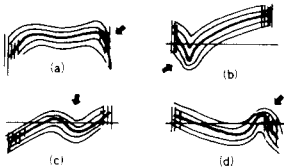
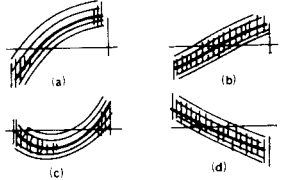
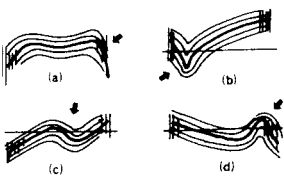
1. Adjustment after replacing camera tube/coil ass'y

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
			TP3 Video board	RV206, 209 Deflection board	Connect the invertable channel of the oscilloscope and set to the INV mode. Set the input range of both channels of the oscilloscope to 10 mV/div (probe: 10 : 1) and set to the ADD mode. Adjust the waveform using RV206, 209 to make it flat.
			TP8 Video board		
				RV212, 215 Deflection board	Set the oscilloscope to the V period. Adjust the waveform using RV212, 215 to make it flat.
					
17	Blue/ modulation shading adjustment	RV205, 208, 211, 214 To correct B signal color unevenness ● Color unevenness increases	TP6 Video board	Iris control at back of camera	Shoot the white chart and set zoom to TELEPHOTO. Adjust the video signal component using the iris control to set to 0.8 V _{p-p} . * When the iris control has not been changed after adjustment in item 15, adjustment is not required.
					

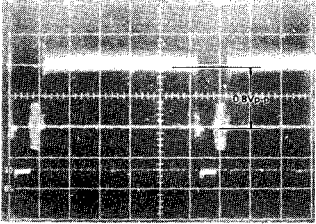
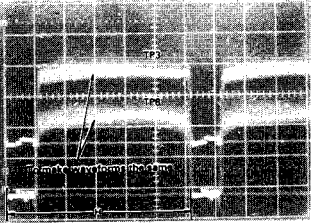
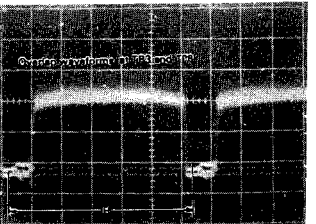
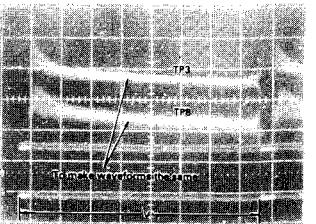
1. Adjustment after replacing camera tube/coil ass'y

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
17			TP3 Video board TP7 Video board	RV205, 208 Deflection board	Connect the invertable channel of the oscilloscope and set to the INV mode. Set the input range of both channels of the oscilloscope to 10 mV/div (probe 10 : 1) and set to the ADD mode. Adjust the waveform using RV205, 208 to make it flat. 
				RV211, 214 Deflection board	Set the oscilloscope to the V period. Adjust the waveform using RV211, 214 to make it flat. 
Adjustment when an oscilloscope which is not provided with either INV or ADD function is used.					
15	Dynamic focus adjustment	RV204, 207, 210, 213 To correct the peripheral beam focusing of the SATICON. To adjust the amount of dynamic focus. ● Color unevenness increases.	TP202 TP203 Deflection board	RV205, 208, 211, 214 RV206, 209, 212, 215 Deflection board	Set RV205, 206, 208, 209, 211, 212, 214, 215 to their mechanical centers. * Or, fit the lens cap and minimize the waveform at TP202, TP203. Adjust RV205, 208, 211, 214 so that the waveform is flat and the level is minimum. Adjust RV206, 209, 212, 215 so that the waveform is flat and the level is minimum. When they are set in item 10, adjustment is not required.
			TP6 Video board	Iris control at back of camera	Shoot the white chart and set zoom to TELEPHOTO. Adjust the video signal component using the iris control to set to 0.8 V _{p-p} . 

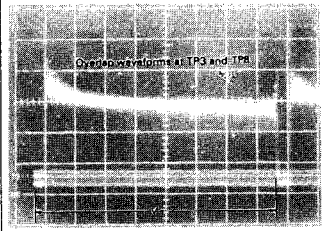
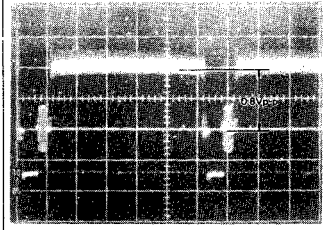
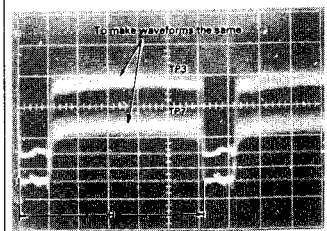
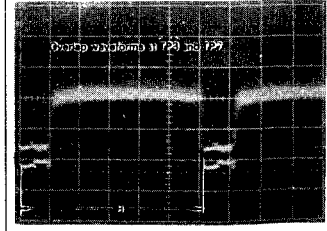
1. Adjustment after replacing camera tube/coil ass'y

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
			TP3 Video board TP8 Video board	RV204, 207 Deflection board	Set the input range of both channels of the oscilloscope to 10 mV/div (probe: 10 : 1) and set to the DUAL mode. Adjust the waveform using RV204, 207 so that it is easy to correct shading.  Waveform making it easy to correct shading  ↔ : Section without correction applied Waveform making it difficult to correct shading
				RV210, 213 Deflection board	Set the oscilloscope to the V period. Adjust the waveform using RV210, 213 so that it is easy to correct shading.  Waveform making it easy to correct shading  ↔ : Section without correction applied Waveform making it difficult to correct shading * When the waveform easy to correct shading is not obtained by the adjustment shown above, adjust the field focus in item 10, and then perform adjustment shown in item 15' again.

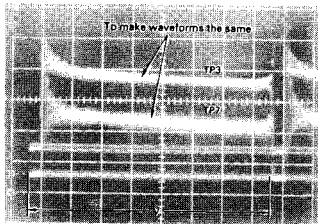
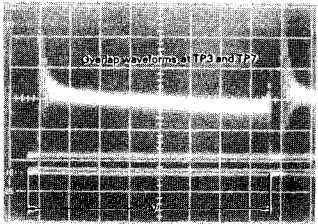
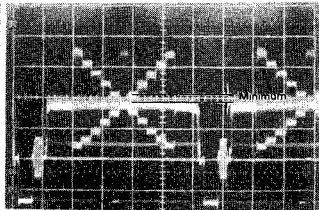
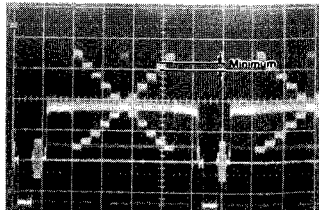
1. Adjustment after replacing camera tube/coil ass'y

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
16'	Red/ modulation shading adjustment	RV206, 209, 212, 215 To correct R signal color unevenness ● Color unevenness increases	TP6 Video board	Iris control at back of camera	Shoot the white chart and set zoom to TELEPHOTO. Adjust the video signal component using the iris control to set to 0.8 V _{P-P} . * When the iris control has not been changed after adjustment in item 15', adjustment is not required. 
			TP3 Video board TP8 Video board	RV206, 209 Deflection board	Set the input range of both channels of the oscilloscope to 10 mV/div (probe: 10 : 1) and set to the DUAL mode. Adjust the waveform using RV206, 209 so that the waveforms at TP3 and TP8 are the same.  Overlap the waveforms at TP3 and TP8. Check that the waveforms at TP3 and TP8 are the same. 
				RV212, 215 Deflection board	Set the oscilloscope to the V period. Adjust the waveform using RV212, 215 so that the waveforms at TP3 and TP8 are the same. 

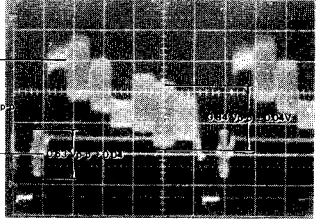
1. Adjustment after replacing camera tube/coil ass'y

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
16'					Overlap the waveforms at TP3 and TP8. Check that the waveforms at TP3 and TP8 are the same. 
17'	Blue/ modulation shading adjustment	RV205, 208, 211, 214 To correct B signal color unevenness ● Color unevenness increases	TP6 Video board	Iris control at back of camera	Shoot the white chart and set zoom to TELEPHOTO. Adjust the video signal component using the iris control to set to 0.8 V_{p-p}. * When the iris control has not been changed after adjustment in item 15', adjustment is not required. 
			TP3 Video board TP7 Video board	RV205, 208 Deflection board	Set the input range of both channels of the oscilloscope to 10 mV/div (probe 10 : 1) and set to the DUAL mode. Adjust the waveform using RV205, 208 so that the waveforms at TP3 and TP7 are the same.  Overlap the waveforms at TP3 and TP7. Check that the waveforms at TP3 and TP7 are the same. 

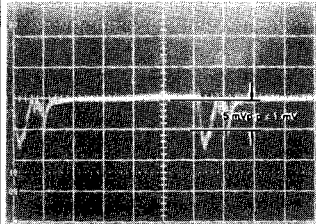
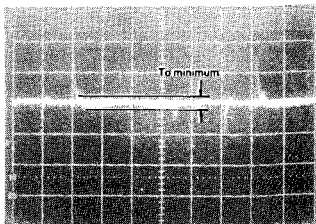
1. Adjustment after replacing camera tube/coil ass'y

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
				RV211, 214 Deflection board	Set the oscilloscope to the V period. Adjust the waveform using RV211, 214 so that the waveforms at TP3 and TP7 are the same.  Overlap the waveforms at TP3 and TP7. Check that the waveforms at TP3 and TP7 are the same. 
18.	Set the iris control to its click position			Iris control at back of camera	Return the iris control to its click position
19.	White balance adjustment (II)	RV902 To match the YL signal and B signal levels and adjust so that white balance is correct. ● White balance is not correct RV905 To match the YL and R signal levels and adjust so that white balance is correct ● White balance is not correct	TP6 Video board	RV902, 905 Chroma board	Shoot the gray scale chart. Adjust RV902 and RV905 alternately to minimize the carrier at the 6th ~ 8th steps from the bottom of the staircase wave.  * Difference between the white balance adjustment (I) and (II): (I): Temporary adjustments before shading adjustment (II): Adjustment after shading adjustment
20.	De-γ (degamma) adjustment	RV220, 221 To adjust the level and amount of degamma of the R signal. ● Bright white section colored RV222, 223 To adjust the level and amount of degamma of the B signal. ● Bright white section colored.	TP6 Video board	RV220 ~ 223 Deflection board	Shoot the gray scale chart. Adjust RV220 ~ 223 alternately to minimize the carrier of the white section (10th, 11th steps from the bottom) of the staircase wave. 

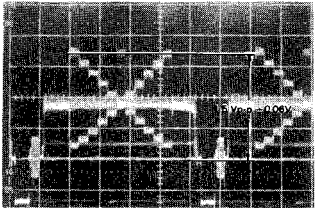
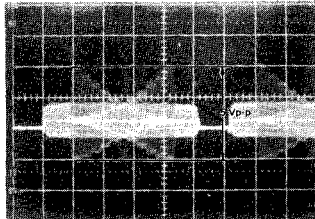
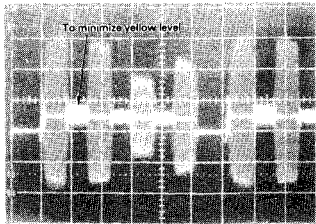
1. Adjustment after replacing camera tube/coil ass'y

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
21.	Red phase adjustment	RV10 To match the red phase. ● The red phase does not match the object	TV screen	RV10 Video board	Shoot the color bar chart. Adjust tint using RV10 so that tints of the chart and the TV picture match.
22.	Chroma gain/burst level adjustment	RV8 To match the color saturation ● Color gets less dense. Or, it gets too dense and color noise becomes conspicuous RV7 To adjust the burst level ● Not colored, tint does not match	TP6 Video board	Iris control at back of camera RV8 Video board Iris control RV7 Video board	Shoot the color bar chart. Adjust the white level of the color bar using the iris control to set to 1.3 V _{D-P} .  Adjust the red carrier level of the waveform using RV8 to set to 0.84 V _{D-P} ± 0.04V. Return the iris control to its click position. Adjust the burst level of the waveform using RV7 to set to 0.63 V _{D-P} ± 0.04V.
23.	Smear adjustment	CV401 To correct frequency response of the preamplifier. ● Green or magenta smear occurs on the right side of bright white sections	TV screen	CV401 Preamplifier board	Perform this adjustment only when color smear occurs. When smear is adjusted, readjust the chroma carrier level, black balance, white balance (I) and degamma. Shoot the gray scale chart so that it fills the TV screen. Adjust color smear using CV401 so that color smear is not present on the right white section of the gray scale of the TV screen.

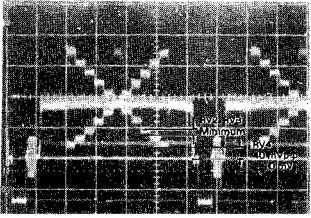
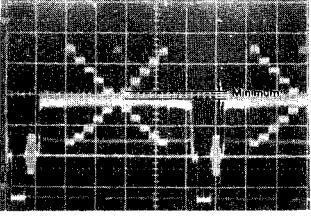
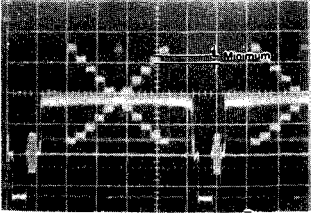
2. Adjustment after replacing video circuit board

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
1.	Bias light adjustment	RV9 To adjust bias light potential ● When the voltage is too low, residual image (picture is greenish) when brightness increases slightly.	TP1 Video board	RV9 Video board	Fit the lens cap. Set the probe to 1 : 1 and connect to TP1 via a resistor. Adjust the level nearer to the center using RV9 so that it is $5\text{m V}_{p-p} \pm 1\text{ mV}$. 
2.	Pulse canceller adjustment	RV5 To adjust so that the setup does not change when the iris control is varied. ● The whole picture changes to red or green	TP6 Video board	RV1 Video board RV5 Video board Iris control at back of camera	Fit the lens cap. Temporarily adjust setup using RV1 to set to 0.4 V_{p-p} .  Adjust RV5 so that the waveform level does not change when the iris is moved alternately from fully open to fully closed.
3.	Y setup adjustment	RV1 To adjust setup of the luminance signal. ● Picture becomes whitish or seems sunk.	TP6 Video board	RV1 Video board	Fit the lens cap. Adjust setup using RV1 to set to $60\text{ mV}_{p-p} \pm 40\text{ mV}$. 
4.	Edge balance adjustment	RV6 To adjust so that only the vertical edge signal is mixed with the luminance signal. ● The whole screen becomes red or green	TP6 Video board TP2 Video board	RV6 Video board	Shoot the gray scale chart. Set the input range of the oscilloscope to 10 mV/div (probe 10 : 1) Adjust RV6 to minimize the waveform. 

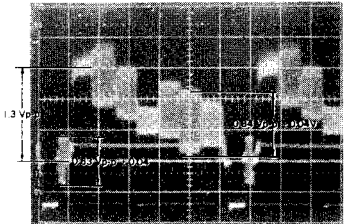
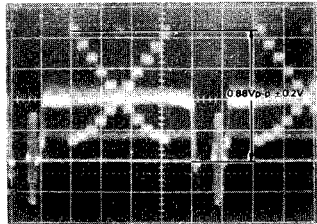
2. Adjustment after replacing video circuit board

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
5.	Video level adjustment	RV203 To set the balance point of the lens automatic iris to keep the video output level constant. ● Illumination is sufficient but the picture is too dark or the picture is too bright and bright sections are saturated.	TP6 Video board	RV203 Deflection board	Shoot the gray scale chart. Adjust the video signal component of the waveform using RV203 and set it to $1.5 V_{p-p} \pm 0.06V$. 
6.	Chroma carrier level adjustment	RV903 To adjust the carrier level of the chroma signal. ● No color, tint abnormal.	TP901 Chroma board	RV903 Chroma board	Turn RV220, 222 fully counterclockwise. Shoot the gray scale chart. Adjust RV903 to obtain $1.5 V_{p-p} \pm 0.5V$. 
7.	Color separation adjustment	RV901 To adjust the carrier phase shift angle with the R/B separation circuit. ● Color reproduction faulty. Mixed color. RV904 To adjust the 1H delayed carrier level of the chroma signal and match it with the chroma signal carrier level of the phase shifter output. ● Color saturation and purity are deteriorated causing mixing of colors.	TP901 Chroma board	RV901, 904 Chroma board	Shoot the color bar chart. Adjust RV901 and RV904 alternately to minimize yellow level of the color bar. 

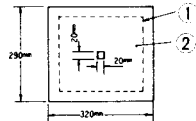
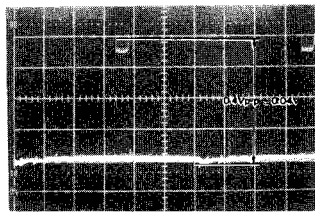
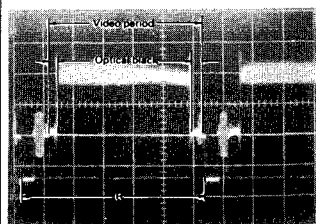
2. Adjustment after replacing video circuit board

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
8.	Black balance adjustment	RV4 To cut the dark portion of the YL signal so the dark portion is not colored. ● The dark portion of the picture becomes discolored. RV2 To adjust setup of the YL signal. ● The dark portion of the picture is colored green or magenta. RV3 Adjust setup of the B signal. ● The dark portion of the picture is colored blue or yellow.	TP6 Video board	RV4 (Video board) RV2, 3 (Video board)	Shoot the gray scale chart. Turn RV4 fully counterclockwise. Adjust RV2 and RV3 alternately to minimize the carrier at the 2nd ~ 3rd steps from the bottom of the staircase wave. 
			TP3 Video board	RV4	Adjust RV4 so that the level at the bottom of the staircase wave is 40 mV _{P-P} ± 10 mV.
9.	White balance adjustment (I)	RV902 To match the YL and B signal levels and adjust so that white balance is obtained. ● White balance is not obtained. RV905 To match the YL and R signal levels and adjust so that white balance is obtained. ● White balance is not obtained.	TP6 Video board	RV902,905 Chroma board	Turn RV220, 222 fully counterclockwise. Shoot the gray scale chart. Adjust RV902 and RV905 alternately to minimize the carrier at the 6th ~ 8th steps from the bottom of the staircase wave. 
10.	De-γ (degamma) adjustment	RV220, 221 To adjust the level and amount of degamma of the R signal. ● Bright white section colored RV222, 223 To adjust the level and amount of degamma of the B signal. ● Bright white section colored.	TP6 Video board	RV220 ~ 223 Deflection board	Shoot the gray scale chart. Adjust RV220 ~ 223 alternately to minimize the carrier of the white section (10th, 11th steps from the bottom) of the staircase wave. 
11.	Red phase adjustment	RV10 To match the red phase. ● The red phase does not match the object	TV screen	RV10 Video board	Shoot the color bar chart. Adjust tint using RV10 so that tints of the chart and the TV picture match.

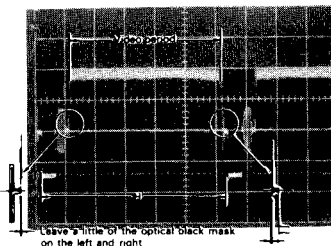
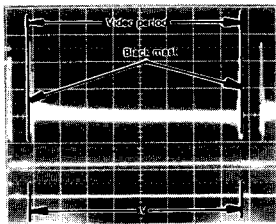
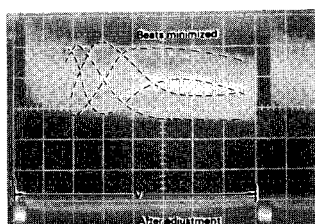
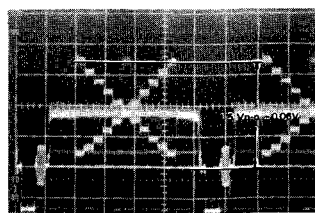
2. Adjustment after replacing video circuit board

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
12.	Chroma gain/burst level adjustment	RV8 To match the color saturation - Color gets less dense. Or, it gets too dense and color noise becomes conspicuous RV7 To adjust the burst level - Not colored, tint does not match	TP6 Video board	Iris control at back of camera RV8 Video board Iris control RV7 Video board	Shoot the color bar chart. Adjust the white level of the color bar using the iris control to set to 1.3 V _{p-p} .  Adjust the red carrier level of the waveform using RV8 to set to 0.84 V _{p-p} ± 0.04V. Return the iris control to its click position. Adjust the burst level of the waveform using RV7 to set to 0.63 V _{p-p} ± 0.04V.
The following 2 adjustments are performed only when adjustments are required after check.					
13.	Level indicator adjustment	RV12 To adjust point at which the "L" indicator lights showing these is too little light "L" indicator does not light when the picture level gets lower, always remaining lit.	TP6 Video board Viewfinder "L" indicator	Iris control at back of camera RV12 Video board	Shoot the gray scale chart. Adjust video signal component of waveform and set its level to 0.88V _{p-p} .  Adjust RV12 so the "L" indicator changes from lit to out.
14.	White balance indicator adjustment	RV11 To adjust so that "W" indicator goes off only when white balance is obtained during white balance check. White balance is drifted but "W" indicator goes out.	Viewfinder "W" indicator	RV11 Video board	Shoot the gray scale chart. Continuously press white balance control at the click position. Adjust RV11 to set to the middle point within the range where "W" indicator goes out.

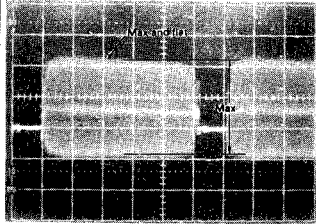
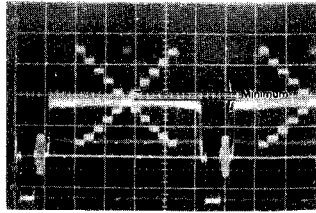
3. Adjustment after replacing deflection circuit board

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
1.	Beam voltage adjustment	RV202 To adjust electron beam amount of SATICON by varying G1 voltage. - When the voltage is too low: The high bright (white) sections of the gray scale cannot be discriminated. When the voltage is lowered further, picture does not appear. - When the voltage is too high: Magenta ghost appears to the right side of the high bright (white) section of the gray scale. Or, horizontal green color appears in that section. Shading amount increases.	TV screen	TP6 Video board LV201, RV216 ~ 219, deflection board	Shoot the test chart A. Adjust LV201, RV216 ~ 219 when the circle of the chart is not round. This adjustment is not required when the circle is approximately round. Adjust the following: RV217: Horizontal centering LV201: Horizontal size (wide) RV216: Horizontal linearity RV219: Vertical centering RV218: Vertical size (height)
			TP1 Video board	RV202 Deflection board	Shoot the chart shown in the diagram. ① Shooting range ② Provide a hole (20 × 20 mm) at the center of a black paper which does not transmit light.  Adjust the clip level of the waveform using RV202 and set it to $0.32 V_{p-p} \pm 0.02V$. 
2.	Horizontal size/linearity adjustment	LV201 To adjust horizontal deflection size - The circle chart is distorted. Color balance is not obtained but changes to green. RV217 To adjust horizontal deflection position - Black mask appears on the left or right of the screen RV216 To adjust horizontal deflection linearity. - The circle chart is distorted. Color unevenness appears on the left or right.	TP6 Video board	LV201 Deflection board	Shoot white chart. Zoom: TELEPHOTO Adjust LV201 to shorten the waveform width. 
				RV217 Deflection board	Adjust RV217 and set the optical black mask so it is symmetrical on the left and right.
			TV screen	RV216 Deflection board	Shoot the test chart A. Adjust RV216 so that the circle on the TV screen is symmetrical on the left and right.
			TP6 Video board	LV201 (RV217)	Shoot the white chart. Zoom: TELEPHOTO Adjust LV201 so that a little optical black mask remains on the left and right. Fine adjust RV217 so that the optical black mask is symmetrical on the left and right.

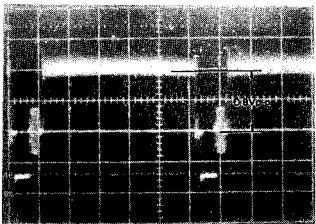
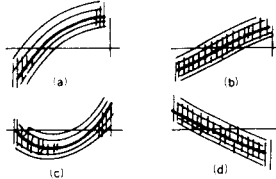
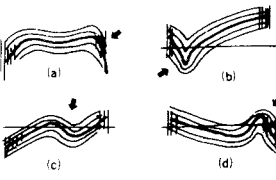
3. Adjustment after replacing deflection circuit board

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
					
3.	Vertical size/centering adjustment	RV218 To adjust vertical deflection size - The circle chart is distorted (becomes an ellipse) RV219 To adjust vertical deflection centering - The circle chart is distorted. Green mask appears at the top or bottom of the screen.	TP6 Video board	RV218 Deflection board	Shoot the white chart Zoom: TELEPHOTO Set the oscilloscope to the V period. Adjust RV218 and shorten the waveform width to make the black mask appear on the left and right. 
				RV219 Deflection board	Adjust RV219 so the black mask is symmetrical on the left and right.
			TP1 Video board	RV218 (RV219)	Adjust RV218 to minimize waveform beats. Fine adjust RV219 so that the black mask is symmetrical on the left and right. 
4.	Video level adjustment	RV203 To set the balance point of the lens automatic iris to keep the video output level constant. Illumination is sufficient but the picture is too dark or the picture is too bright and bright sections are saturated.	TP6 Video board	RV203 Deflection board	Shoot the gray scale chart. Adjust the video signal component of the waveform using RV203 and set it to $1.5 V_{p-p} \pm 0.06V$. 

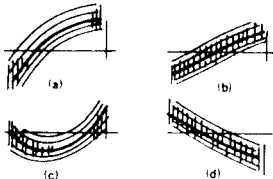
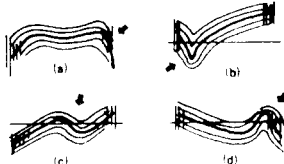
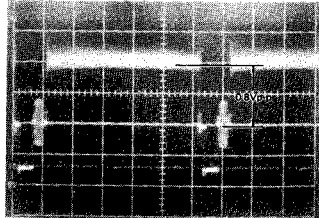
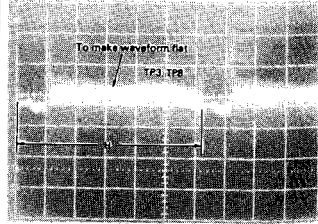
3. Adjustment after replacing deflection circuit board

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
5.	Field focus adjustment	RV201 To adjust the focus electrode voltage of the SATICON so that the electron beam output from the cathode is focused on the photoconductive film. ● Focus is not obtained when the focus ring or the focus adjusting screw of the lens is turned.	TP201 TP202 TP203 Deflection board TP901 Chroma board	RV204, 207, 210, 213 RV205, 208, 211, 214 RV206, 209, 212, 215 Deflection board RV201 Deflection board	Set RV204 ~ 215 to their mechanical centers. * Or, fit the lens cap and minimize the waveforms at TP201 ~ 203. Oscilloscope: 5 mV/div (Probe: 10 : 1) Adjust RV204, 207, 210, 213 so the waveform is flat and level minimum. Adjust RV205, 208, 211, 214 so the waveform is flat and level minimum. Adjust RV206, 209, 212, 215 so the waveform is flat and level minimum. Shoot the white chart. Zoom: TELEPHOTO Adjust RV201 so the carrier level max. and flat without peaks and troughs. 
6.	White balance adjustment (I)	RV902 To match the YL and B signal levels and adjust so that white balance is obtained. ● White balance is not obtained. RV905 To match the YL and R signal levels and adjust so that white balance is obtained. ● White balance is not obtained.	TP6 Video board	RV902, 905 Chroma board	Turn RV220, 222 fully counterclockwise. Shoot the gray scale chart. Adjust RV902 and RV905 alternately to minimize the carrier at the 6th ~ 8th steps from the bottom of the staircase wave. 

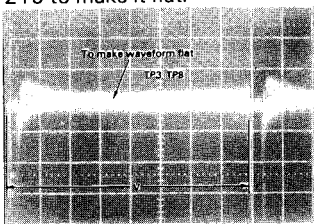
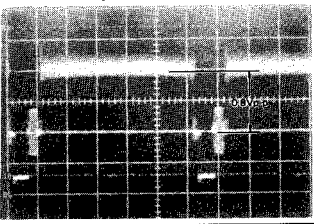
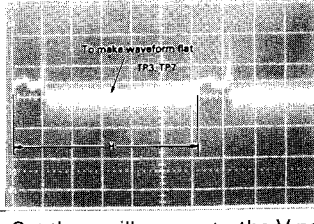
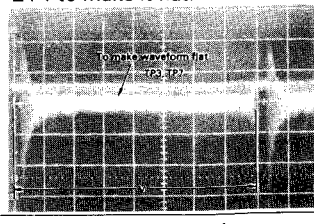
3. Adjustment after replacing deflection circuit board

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
The following items 7 ~ 9 are the adjustments used when the oscilloscope is provided with both INV (invert) and ADD (addition) functions. Refer to the adjustment method in items 7' ~ 9' when the oscilloscope is not provided with either of the two functions.					
7.	Dynamic focus adjustment	RV204, 207, 210, 213 To correct focusing of peripheral beams of SATICON. To adjust amount of dynamic focus. ● Color unevenness increases.	TP202	RV205, 208, 211, 214	Set RV205, 206, 207, 208, 209, 211, 212, 214, 215 to their mechanical centers. * Or, fit the lens cap and minimize the waveform at TP202, TP203. Adjust RV205, 208, 211, 214 so that the waveform is flat and the level is minimum.
			TP203 Deflection board	RV206, 209, 212, 215 Deflection board	Adjust RV206, 209, 212, 215 so that the waveform is flat and the level is minimum. This item is not required when they are set in item 5.
			TP6 Video board	Iris control at back of camera	Shoot the white chart and set zoom to TELEPHOTO. Adjust the video signal component with the iris control to set to $0.8V_{p-p}$ 
			TP3 Video board	RV204, 207 Deflection board	Connect the invertable channel of the oscilloscope and set to the INV mode.
			TP8 Video board		Set the input range of both channels of the oscilloscope to 10 mV/div (probe : 10 : 1) and set to the ADD mode. Adjust the waveform using RV204, 207 so that it is easy to correct shading.  Waveform making it easy to correct shading  ◆ : Section without correction applied Waveform making it difficult to correct shading

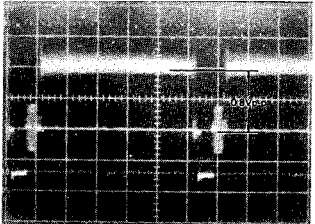
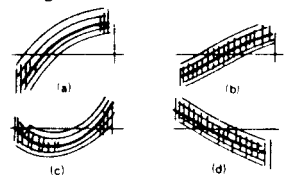
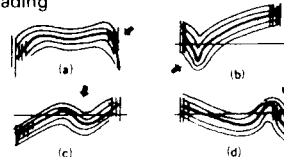
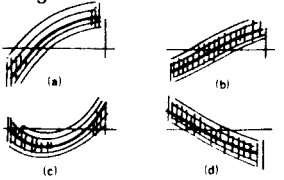
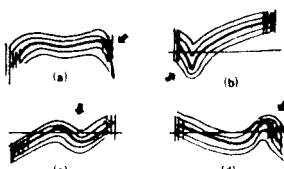
3. Adjustment after replacing deflection circuit board

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
				RV210, 213 Deflection board	Set the oscilloscope to the V period. Adjust the waveform using RV210, 213 so that it is easy to correct shading.  Waveform making it easy to correct shading  ◆ : Section without correction applied Waveform making it difficult to correct shading * When the waveform easy to correct shading is not obtained by the adjustment shown above, adjust the fixed focus in item 5, and then perform adjustment shown in item 7 again.
8.	Red/ Modulation shading adjustment	RV206, 209, 212, 215 To correct R signal color unevenness ● Color unevenness increases	TP6 Video board	Iris control at back of camera	Shoot the white chart and set zoom to TELEPHOTO. Adjust the video signal component using the iris control to set to 0.8V_{p-p}. * When the iris control has not been changed after adjustment in item 7, adjustment is not required. 
			TP3 Video board TP8 Video board	RV206 209 Deflection board	Connect the invertable channel of the oscilloscope and set to the INV mode. Set the input range of both channels of the oscilloscope to 10 mV/div (probe: 10 : 1) and set to the ADD mode. Adjust the waveform using RV206, 209 to make it flat. 

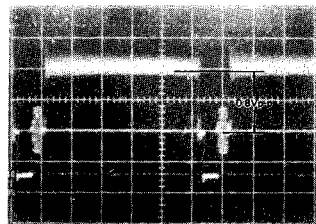
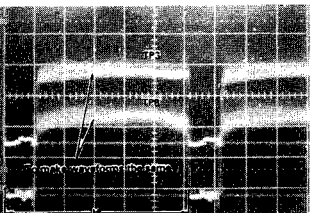
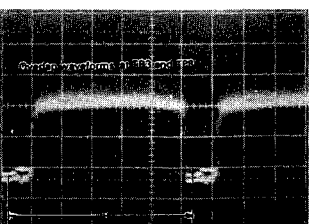
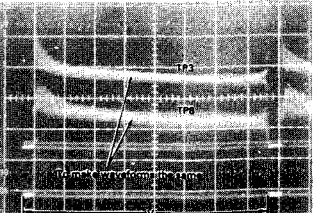
3. Adjustment after replacing deflection circuit board

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
				RV212, 215 Deflection board	Set the oscilloscope to the V period. Adjust the waveform using RV212, 215 to make it flat. 
9.	Blue/ modulation shading adjustment	RV205, 208, 211, 214 To correct B signal color unevenness ● Color unevenness increases	TP6 Video board	Iris control at back of camera	Shoot the white chart and set zoom to TELEPHOTO. Adjust the video signal component using the iris control to set 0.8Vp-p. * When the iris control has not been changed after adjustment in item 7, adjustment is not required. 
			TP3 Video board TP7 Video board	RV205, 208 Deflection board	Connect the invertable channel of the oscilloscope and set to the INV mode. Set the input rang of both channels of the oscilloscope to 10 mV/div (probe, 10 : 1) and set to the ADD mode. Adjust the waveform using RV205, 208 to make it flat. 
			RV211, 214 Deflection board	Set the oscilloscope to the V period. Adjust the waveform using RV211, 214 to make it flat. 	
Adjustment when an oscilloscope which is not provided with either INV or ADD function is used.					
7'	Dynamic focus adjustment	RV204, 207, 210 213 To correct the peripheral beam focusing of the SATICON. To adjust the amount of dynamic focus. ● Color unevenness increases	TP202	RV205, 208, 211, 214	Set RV205, 206, 208, 209, 211, 212, 214, 215 to their mechanical centers. * Or, fit the lens cap and minimize the waveforms at TP202, TP203. Adjust RV205, 208, 211, 214 so that the waveform is flat and the level is minimum.

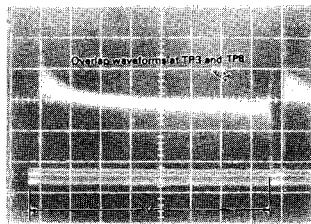
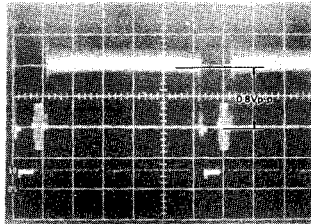
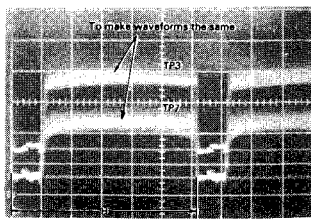
3. Adjustment after replacing deflection circuit board

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
			TP203 Deflection board	RV206, 209, 212, 215 Deflection board	Adjust RV206, 209, 212, 215 so that the waveform is flat and the level is minimum.
			TP6 Video board	Iris control at back of camera	Shoot the white chart and set zoom to TELEPHOTO. Adjust the video signal component using the iris control to set to 0.8V _{p-p} . 
			TP3 Video board TP8 Video board	RV204, 207 Deflection board	Set the input range of both channels of the oscilloscope to 10 mV/div (probe; 10 : 1) and set to the DUAL mode. Adjust the waveform using RV204, 207 so that it is easy to correct shading.  Waveform making it easy to correct shading  ↔ : Section without correction applied Waveform making it difficult to correct shading
				RV210, 213 Deflection board	Set the oscilloscope to the V period. Adjust the waveform using RV210, 213 so that it is easy to correct shading.  Waveform making it easy to correct shading  ↔ : Section without correction applied Waveform making it difficult to correct shading

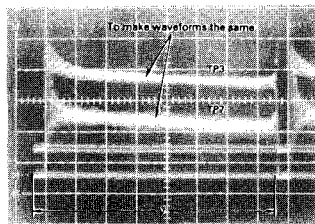
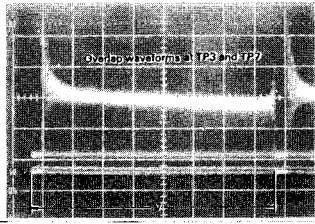
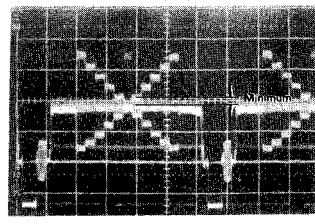
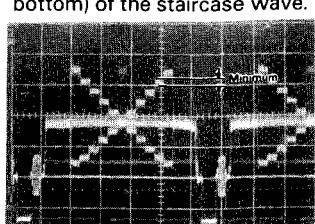
3. Adjustment after replacing deflection circuit board

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
					* When the waveform easy to correct shading is not obtained by the adjustment shown above, adjust the field focus in item 5, and then perform adjustment shown in item 7' again.
8'	Red/ modulation shading adjustment	RV206, 209, 212, 215 To correct R signal color unevenness ● Color unevenness increases	TP6 Video board	Iris Control at back of camera	Shoot the white chart and set zoom to TELEPHOTO. Adjust the video signal component using the iris control to set to 0.8 V_{p-p}. * When the iris control has not been changed after adjustment in item 7', adjustment is not required. 
			TP3 Video board TP8 Video board	RV206, 209 Deflection board	Set the input range of both channels of the oscilloscope to 10 mV/div (probe: 10 : 1) and set to the DUAL mode. Adjust the waveform using RV206, 209 so that the waveforms at TP3 and TP8 are the same.  Overlap the waveforms at TP3 and TP8. Check that the waveforms at TP3 and TP8 are the same. 
				RV212, 215 Deflection board	Set the oscilloscope to the V period. Adjust the waveform using RV212, 215 so that the waveforms at TP3 and TP8 are the same. 

3. Adjustment after replacing deflection circuit board

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
					Overlap the waveforms at TP3 and TP8. Check that the waveforms at TP 3 and TP8 are the same. 
9'	Blue/ modulation shading adjustment	RV205, 208, 211, 214 To correct B signal color unevenness ● Color unevenness increases	TP6 Video board	Iris control at back of camera	Shoot the white chart and set zoom to TELEPHOTO. Adjust the video signal component using the iris control to set to 0.8 V_{p-p}. * When the iris control has not been changed after adjustment in item 7', adjustment is not required. 
			TP3 Video board TP7 Video board	RV205, 208 Deflection board	Set the input range of both channels of the oscilloscope to 10 mV/div (probe: 10 : 1) and set to the DUAL mode. Adjust the waveform using RV205, 208 so that the waveforms at TP3 and TP7 are the same.  Overlap the waveforms at TP3 and TP7. Check that the waveforms at TP3 and TP7 are the same. 

3. Adjustment after replacing deflection circuit board

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
				RV211, 214 Deflection board	Set the oscilloscope to the V period. Adjust the waveforms using RV211, 215 so that the waveforms at TP3 and TP7 are the same. 
					Overlap the waveforms at TP3 and TP7. Check that the waveforms at TP3 and TP7 are the same. 
10.	Set the iris control to its click position			Iris control at back of camera	Return the iris control to its click position
11.	White balance adjustment (II)	RV902 To match the YL signal and B signal levels and adjust so that white balance is correct ● White balance is not correct RV905 To match the YL and R signal levels and adjust so that white balance is correct ● White balance is not correct	TP6 Video board	RV902, 905 Chroma board	Shoot the gray scale chart. Adjust RV902 and RV905 alternately to minimize the carrier at the 6th ~ 8th steps from the bottom of the staircase wave.  * Difference between the white balance adjustment (I) and (II): (I) : Temporary adjustment before shading adjustment (II): Adjustment after shading adjustment
12.	De-γ (degamma) adjustment	RV220, 221 To adjust the level and amount of degamma of the R signal. ● Bright white section colored RV222, 223 To adjust the level and amount of degamma of the B signal ● Bright white section colored.	TP6 Video board	RV220 ~ 223 Deflection board	Shoot the gray scale chart. Adjust RV220 ~ 223 alternately to minimize the carrier of the white section (10th, 11th steps from the bottom) of the staircase wave. 

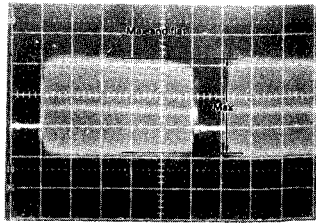
4. Adjustment after replacing preamplifier circuit board

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
	Smear adjustment	CV401 To correct frequency response of the preamplifier. ● Green or magenta smear occurs on the right side of bright white sections	TV screen		Perform this adjustment only when color smear occurs. When smear is adjusted, readjust the chroma carrier level, black balance, white balance (I) and degamma. Shoot the gray scale chart so that it fills the TV screen.
			TV screen	CV401 Preamplifier board	Adjust color smear using CV401 so that color smear is not present on the right white section of the gray scale of the TV screen.

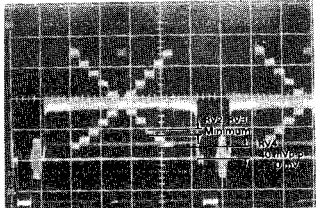
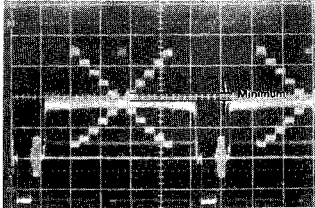
5. Adjustment after replacing regulator circuit board

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
	Power voltage adjustment	RV1101 To set camera circuit power voltage	TP1101 Regulator board	RV1101 Regulator board	Adjust the indication of the voltmeter using RV1101 to set to $9V \pm 0.05V$.

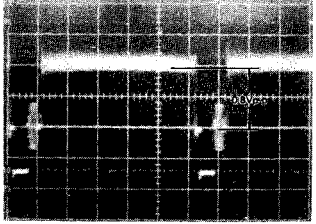
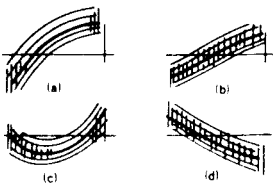
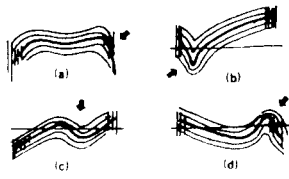
6. Faulty shading adjustment

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
1.	Field focus adjustment	RV201 To adjust the focus electrode voltage of the SATICON so that the electron beam output from the cathode is focused on the photoconductive film. ● Focus is not obtained when the focus ring or the focus adjusting screw of the lens is turned.	TP201 TP202 TP203 Deflection board TP901 Chroma board	RV204, 207 210, 213 RV205, 208 211, 214 RV206, 209 212, 215 Deflection board RV201 Deflection board	Set RV204 ~ 215 to their mechanical centers. * Or, fit the lens cap and minimize the waveforms at TP201 ~ 203. Oscilloscope: 5 mV/div (Probe: 10 : 1) Adjust RV204, 207, 210, 213 so the waveform is flat and its level minimum. Adjust RV205, 208, 211, 214 so the waveform is flat and level minimum. Adjust RV206, 209, 212, 215 so the waveform is flat and level minimum. Shoot the white chart. Zoom: TELE PHOTO Adjust RV201 so the carrier level max. and flat without peaks and troughs. 

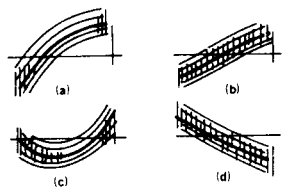
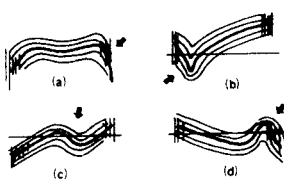
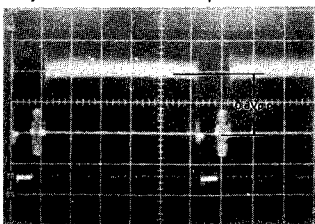
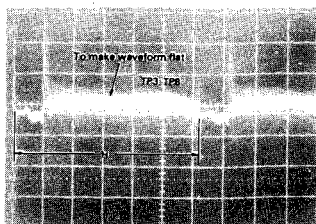
6. Faulty shading adjustment

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
2.	Black balance adjustment	RV4 To cut the dark portion of the Y_L signal so the dark portion is not colored. - The dark portion of the picture becomes discolored. RV2 To adjust setup of the Y_L signal. - The dark portion of the picture is colored green or magenta. RV3 Adjust setup of the B signal. - The dark portion of the picture is colored blue or yellow.	TP6 Video board	RV4 (Video board) RV2, 3 (Video board)	Shoot the gray scale chart. Turn RV4 fully counterclockwise. Adjust RV2 and RV3 alternately to minimize the carrier at the 2nd ~ 3rd steps from the bottom of the staircase wave. 
			TP3 Video board	RV4	Adjust RV4 so that the level at the bottom of the staircase wave is 40 mV _{p-p} ± 10 mV.
3.	White balance adjustment (I)	RV902 To match the Y_L and B signal levels and adjust so that white balance is obtained. - White balance is not obtained. RV905 To match the Y_L and R signal levels and adjust so that white balance is obtained. - White balance is not obtained.	TP6 Video board	RV902,905 Chroma board	Turn RV220, 222 fully counterclockwise. Shoot the gray scale chart. Adjust RV902 and RV905 alternately to minimize the carrier at the 6th ~ 8th steps from the bottom of the staircase wave. 

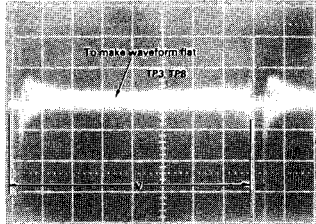
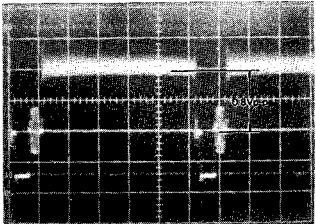
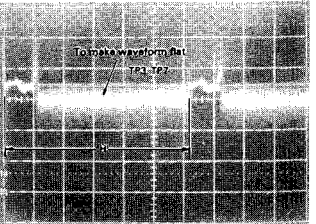
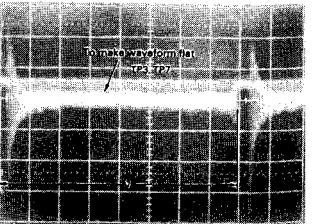
6. Faulty shading adjustment

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
The following items 4 ~ 6 are the adjustments used when the oscilloscope is provided with both INV (invert) and ADD (addition) functions. Refer to the adjustment method in items 4' ~ 6' when the oscilloscope is not provided with either of the two functions.					
4.	Dynamic focus adjustment	RV204, 207, 210, 213 To correct focusing of peripheral beams of SATICON. To adjust amount of dynamic focus. ● Color unevenness increases.	TP202	RV205, 208, 211, 214	Set RV205, 206, 208, 209, 211, 212, 214, 215 to their mechanical centers. * Or, fit the lens cap and minimize the waveform at TP202, TP203. Adjust RV205, 208, 211, 214 so that the waveform is flat and the level is minimum.
			TP203 Deflection board	RV206, 209, 212, 215 Deflection board	Adjust RV206, 209, 212, 215 so that the waveform is flat and the level is minimum. This item is not required when they are set in item 1.
			TP6 Video board	Iris control at back of camera	Shoot the white chart and set zoom to TELEPHOTO. Adjust the video signal component with the iris control to set to 0.8 V _{p-p} . 
			TP3 Video board	RV204, 207 Deflection board	Connect the invertable channel of the oscilloscope and set to the INV mode. Set the input range of both channels of the oscilloscope to 10 mV/div (probe: 10 : 1) and set to the ADD mode. Adjust the waveform using RV204, 207 so that it is easy to correct shading.  Waveform making it easy to correct shading  ◆ : Section without correction applied Waveform making it difficult to correct shading
			TP8 Video board		

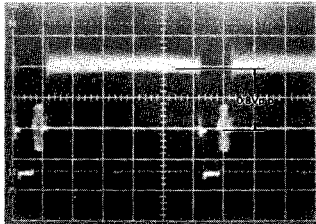
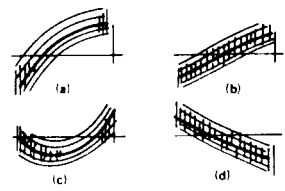
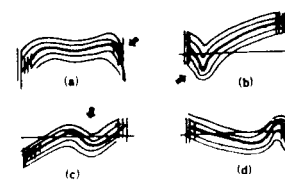
6. Faulty shading adjustment

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
				RV210, 213 Deflection board	Set the oscilloscope to the V period. Adjust the waveform using RV210, 213 so that it is easy to correct shading.  Waveform making it easy to correct shading  ↔ : Section without correction applied Waveform making it difficult to correct shading * When the waveform easy to correct shading is not obtained by the adjustment shown above, adjust the field focus in item 1, and then perform adjustment in item 4 again.
5.	Red/ modulation shading ad- justment	RV206, 209, 212, 215 To correct R signal color uneven- ness ● Color unevenness increases	TP6 Video board	Iris control at back of ca- mera	Shoot the white chart and set zoom to TELEPHOTO. Adjust the video signal component using the iris control to set to 0.8 V_{p-p}. * When the iris control has not been changed after adjustment in item 4, adjustment is not required. 
			TP3 Video board TP8 Video board	RV206, 209 Deflection board	Connect the invertable channel of the oscilloscope and set to the INV mode. Set the input range of both channels of the oscilloscope to 10 mV/div (probe: 10 : 1) and set to the ADD mode. Adjust the waveform using RV206, 209 to make it flat. 

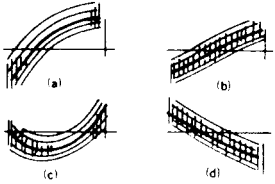
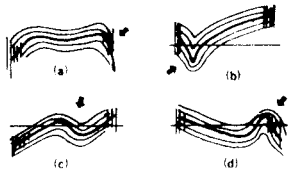
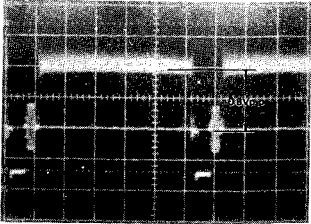
6. Faulty shading adjustment

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
				RV212, 215 Deflection board	Set the oscilloscope to the V period. Adjust the waveform using RV212, 215 to make it flat. 
6.	Blue/ modulation shading ad- justment	RV205, 208, 211, 214 To correct B signal color uneven- ness ● Color unevenness increases	TP6 Video board	Iris control at back of ca- mera	Shoot the white chart and set zoom to TELEPHOTO. Adjust the video signal component using the iris control to set to 0.8 V _{p-p} . * When the iris control has not been changed after adjustment in item 4, adjustment is not required. 
			TP3 Video board TP7 Video board	RV205, 208 Deflection board	Connect the invertable channel of the oscilloscope and set to the INV mode. Set the input rang of both channels of the oscilloscope to 10 mV/div (probe 10 : 1) and set to the ADD mode. Adjust the waveform using RV205, 208 to make it flat. 
				RV211, 214 Deflection board	Set the oscilloscope to the V period. Adjust the waveform using RV211, 214 to make it flat. 

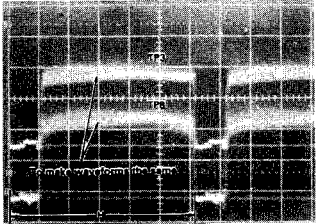
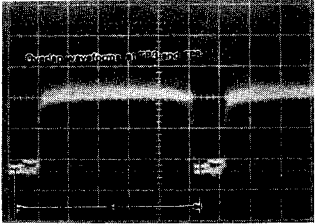
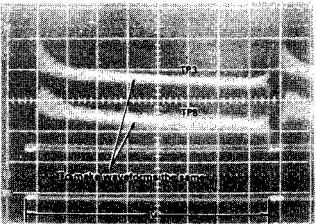
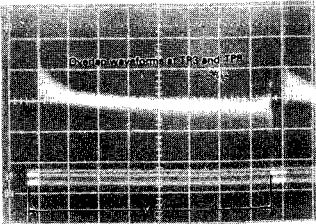
6. Faulty shading adjustment

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
Adjustment when an oscilloscope which is not provided with either INV or ADD function is used.					
4.	Dynamic focus adjustment	RV204, 207, 210, 213 To correct the peripheral beam focusing of the SATICON. To adjust amount of dynamic focus. ● Color unevenness increases.	TP202	RV205, 208, 211, 214	Set RV205, 206, 208, 209, 211, 212, 214, 215 to their mechanical centers. * Or, fit the lens cap and minimize the waveform at TP202, TP203. Adjust RV205, 208, 211, 214 so that the waveform is flat and the level is minimum.
			TP203 Deflection board	RV206, 209, 212, 215 Deflection board	Adjust RV206, 209, 212, 215 so that the waveform is flat and the level is minimum. When they are set in item 1, adjustment is not required.
			TP6 Video board	Iris control at back of camera	Shoot the white chart and set zoom to TELEPHOTO. Adjust the video signal component using the iris control to set to 0.8 V _{p-p} . 
			TP3 Video board	RV204, 207 Deflection board	Set the input range of both channels of the oscilloscope to 10 mV/div (probe: 10:1) and set to the DUAL mode. Adjust the waveform using RV204, 207 so that it is easy to correct shading.
			TP8 Video board		 Waveform making it easy to correct shading  ↔ : Section without correction applied Waveform making it difficult to correct shading

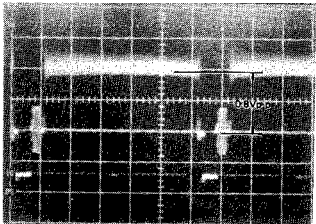
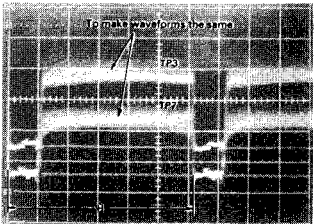
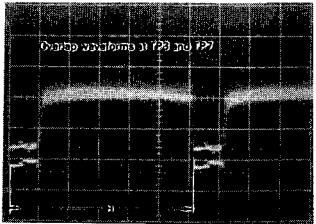
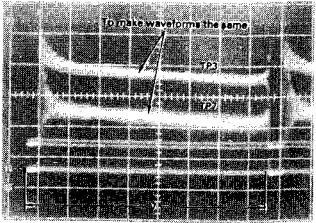
6. Faulty shading adjustment

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
				RV210, 213 Deflection board	Set the oscilloscope to the V period. Adjust the waveform using RV210, 213 so that it is easy to correct shading.  Waveform making it easy to correct shading  ←: Section without correction applied Waveform making it difficult to correct shading * When the waveform easy to correct shading is not obtained by the adjustment shown above, adjust the field focus in item 1, and then perform adjustment shown in item 4' again.
5.	Red/ modulation shading ad- justment	RV206, 209, 212, 215 To correct R signal color uneven- ness ● Color unevenness increases	TP6 Video board	Iris control at back of ca- mera	Shoot the white chart and set zoom to TELEPHOTO. Adjust the video signal component using the iris control to set to 0.8 V_{D-P}. * When the iris control has not been changed after adjustment in item 4', adjustment is not required. 

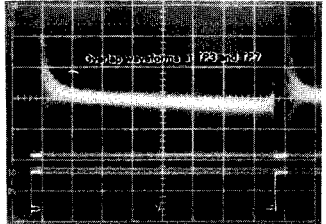
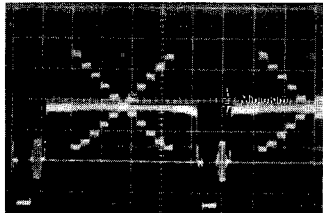
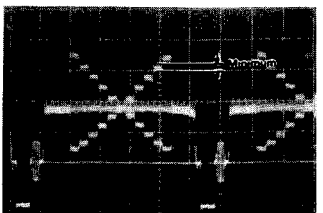
6. Faulty shading adjustment

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
			TP3 Video board TP8 Video board	RV206, 209 Deflection board	Set the input range of both channels of the oscilloscope to 10 mV/div (probe: 10 : 1) and set to the DUAL mode. Adjust the waveform using RV206, 209 so that the waveforms at TP3 and TP8 are the same.  Overlap the waveforms at TP3 and TP8. Check that the waveforms at TP3 and TP8 are the same. 
				RV212, 215 Deflection board	Set the oscilloscope to the V period. Adjust the waveform using RV212, 215 so that the waveforms at TP3 and TP8 are the same.  Overlap the waveforms at TP3 and TP8. Check that the waveforms at TP3 and TP8 are the same. 

6. Faulty shading adjustment

Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
6'	Blue/ modulation shading ad- justment	RV205, 208, 211, 214 To correct B signal color uneven- ness ● Color unevenness increases	TP6 Video board	Iris control at back of ca- mera	Shoot the white chart and set zoom to TELEPHOTO. Adjust the video signal component using the iris control to set to 0.8 V _{p-p} . * When the iris control has not been changed after adjustment in item 4', adjustment is not required. 
			TP3 Video board TP7 Video board	RV205, 208 Deflection board	Set the input range of both chan- nels of the oscilloscope to 10 mV/ div (probe 10 : 1) and set to the DUAL mode. Adjust the waveform using RV205, 208 so that the waveforms at TP3 and TP7 are the same.  Overlap the waveforms at TP3 and TP7. Check that the waveforms at TP3 and TP7 are the same. 
				RV211, 214 Deflection board	Set the oscilloscope to the V period. Adjust the waveform using RV211, 215 so that the waveforms at TP3 and TP7 are the same. 

6. Faulty shading adjustment

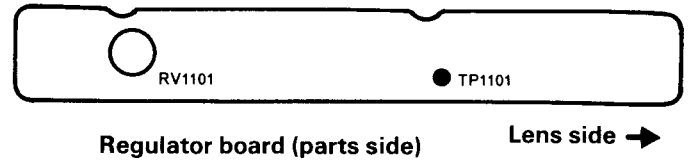
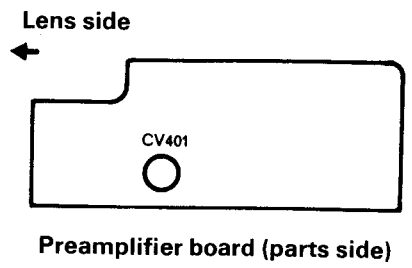
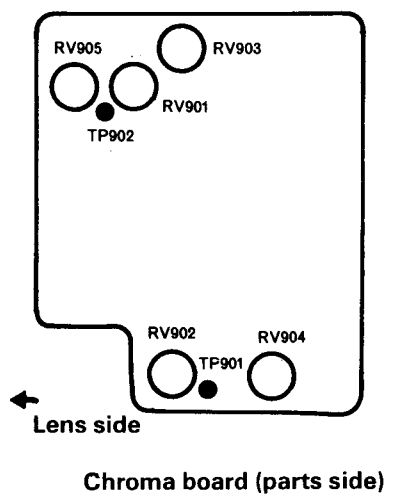
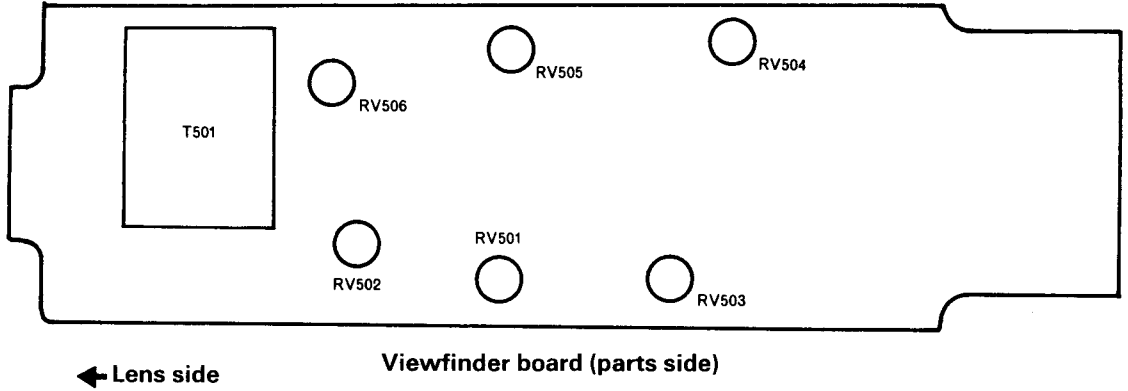
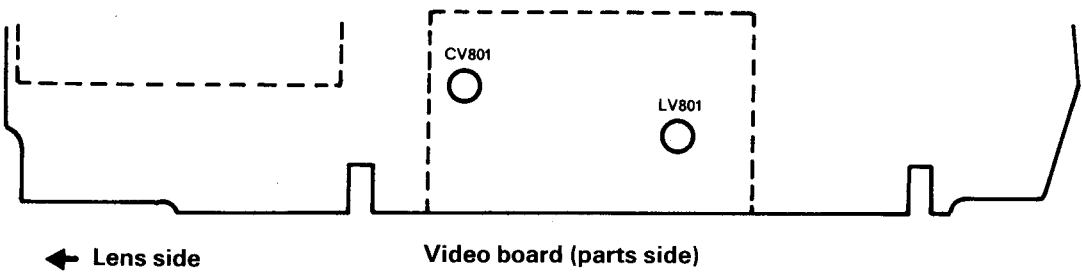
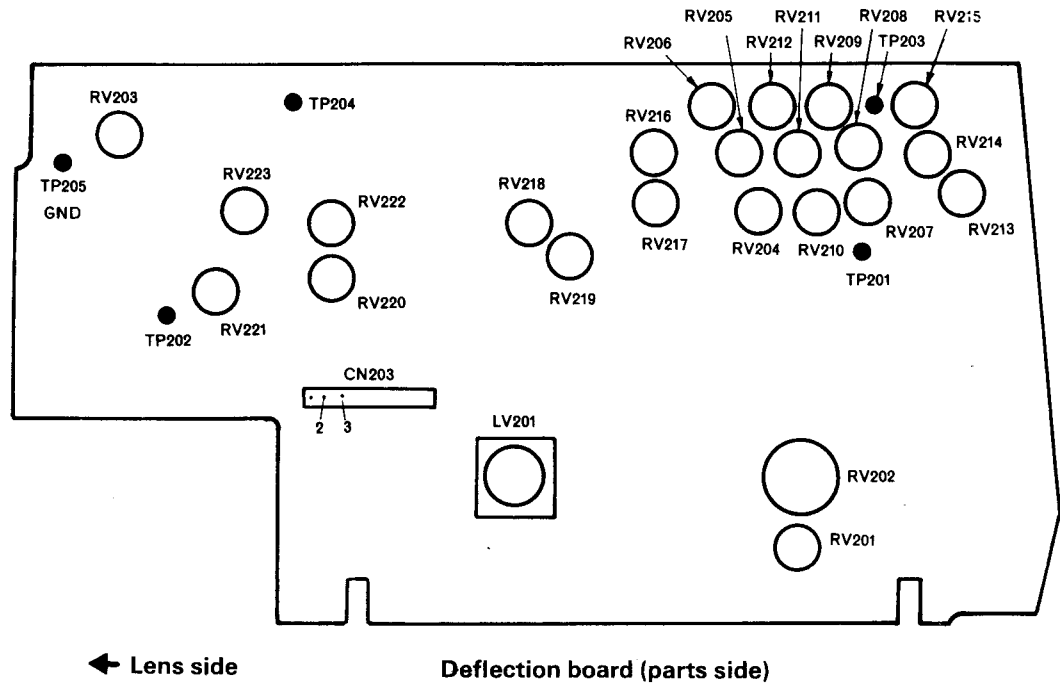
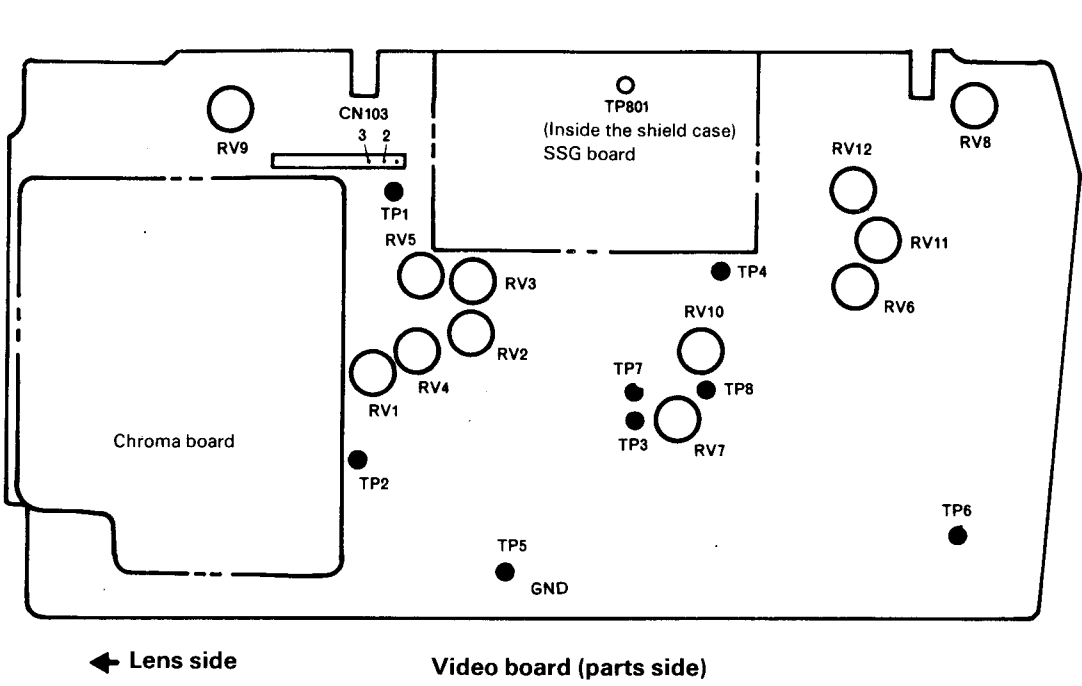
Item No.	Name of adjustment	Purpose of adjustment/ picture phenomena	Test point	Position to be adjusted	Adjustment method & adjustment value
					Overlap the waveforms at TP3 and TP7. Check that the waveforms at TP3 and TP7 are the same. 
7.	Set the iris control to its click position			Iris control at back of camera	Return the iris control to its click position
8.	White balance adjustment (II)	RV902 To match the YL signal and B signal levels and adjust so that white balance is correct. - White balance is not correct RV905 To match the YL and R signal levels and adjust so that white balance is correct - White balance is not correct	TP6 Video board	RV902, 905 Chroma board	Shoot the gray scale chart. Adjust RV902 and RV905 alternately to minimize the carrier at the 6th ~ 8th steps from the bottom of the staircase wave.  * Difference between the white balance adjustment (I) and (II): (I): Temporary adjustment before shading adjustment (II): Adjustment after shading adjustment
9.	De-γ (degamma) adjustment	RV220, 221 To adjust the level and amount of degamma of the R signal. - Bright white section colored RV222, 223 To adjust the level and amount of degamma of the B signal - Bright white section colored	TP6 Video board	RV220 ~ 223 Deflection board	Shoot the gray scale chart. Adjust RV220 ~ 223 alternately to minimize the carrier of the white section (10th, 11th steps from the bottom) of the staircase wave. 

Memo

ADJUSTING PARTS ABBREVIATION LIST

Circuit No.	Abbreviation	Description
RV1	YSET	Y setup
RV2	GSET	Green setup
RV3	RSET	Red setup
RV4	CBC	Chroma black clip
RV5	YPC	Y pulse cancel
RV6	VEB	Video edge balance
RV7	BST	Burst
RV8	CGN	Chroma gain
RV9	BL	Bias light
RV10	RHU	Red hue
RV11	CIS	Color indicator set
RV12	LIS	Level indicator set
RV201	FOC	Focus
RV202	BEAM	Beam
RV203	AVL	Auto iris video level
RV204	DHP	Dynamic focus, Horizontal parabola
RV205	BHP	Blue shading, Horizontal parabola
RV206	RHP	Red shading, Horizontal parabola
RV207	DHS	Dynamic focus, Horizontal sawtooth
RV208	BHS	Blue shading, Horizontal sawtooth
RV209	RHS	Red shading, Horizontal sawtooth
RV210	DVP	Dynamic focus, Vertical parabola
RV211	BVP	Blue shading, Vertical parabola
RV212	RVP	Red shading, Vertical parabola
RV213	DVS	Dynamic focus, Vertical sawtooth
RV214	BVS	Blue shading, Vertical sawtooth
RV215	RVS	Red shading, Vertical sawtooth
RV216	HLN	Horizontal linearity
RV217	HCT	Horizontal centering
RV218	HGT	Height
RV219	VCT	Vertical centering
RV220	RDS	Red degamma slice level
RV221	RDG	Red degamma gain
RV222	BDG	Blue degamma gain
RV223	BDS	Blue degamma slice level
LV201	WID	Width
CV401	SMR	Smear
RV501	CONTR	Contrast
RV502	BRIGHT	Brightness
RV503	H.HOLD	Horizontal hold
RV504	V.HOLD	Vertical hold
RV505	HEIGHT	Height
RV506	FOCUS	Focus
CV801	SCF	Subcarrier frequency
LV801	PLL	Phase locked loop
RV901	CPS	Carrier phase
RV902	BGN	Black gain
RV903	CCL	Chroma carrier level
RV904	CBAL	Carrier balance
RV905	RGN	Red gain
RV1101	REG	Regulator

PARTS LOCATIONS

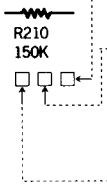


DIAGRAMS

WHEN USING THIS SERVICE REFERENCE MATERIAL

How to read abbreviations

< Resistors >

	Unit indication	No indication Ω K k Ω
	Tolerance indication	No indication $\pm 5\%$ K $\pm 10\%$ M $\pm 20\%$
	Power capacitance indication	No indication 1/4W (All those other than 1/4W are indicated in the circuit diagram. W is omitted.)
	Type indication	No indication Carbon film fixed (carbon) RC Carbon solid (solid) RW Power type on fixed RS Oxide metal film fixed RN Metal film fixed
Example R210 150k Ω , carbon solid RE1/2K 1/2W, $\pm 10\%$		

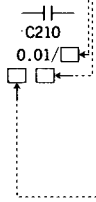
Cautions when using MOS ICs

1. MOS ICs are inserted into black sponge for shipment.

This sponge is conductive and is used to short-circuit between leads to prevent damage. As a result, do not pull out ICs from this black sponge during the storage of ICs. Avoid pulling out ICs from the sponge and putting them on the plastic which is likely to be charged or inserting them in foamed styrol.

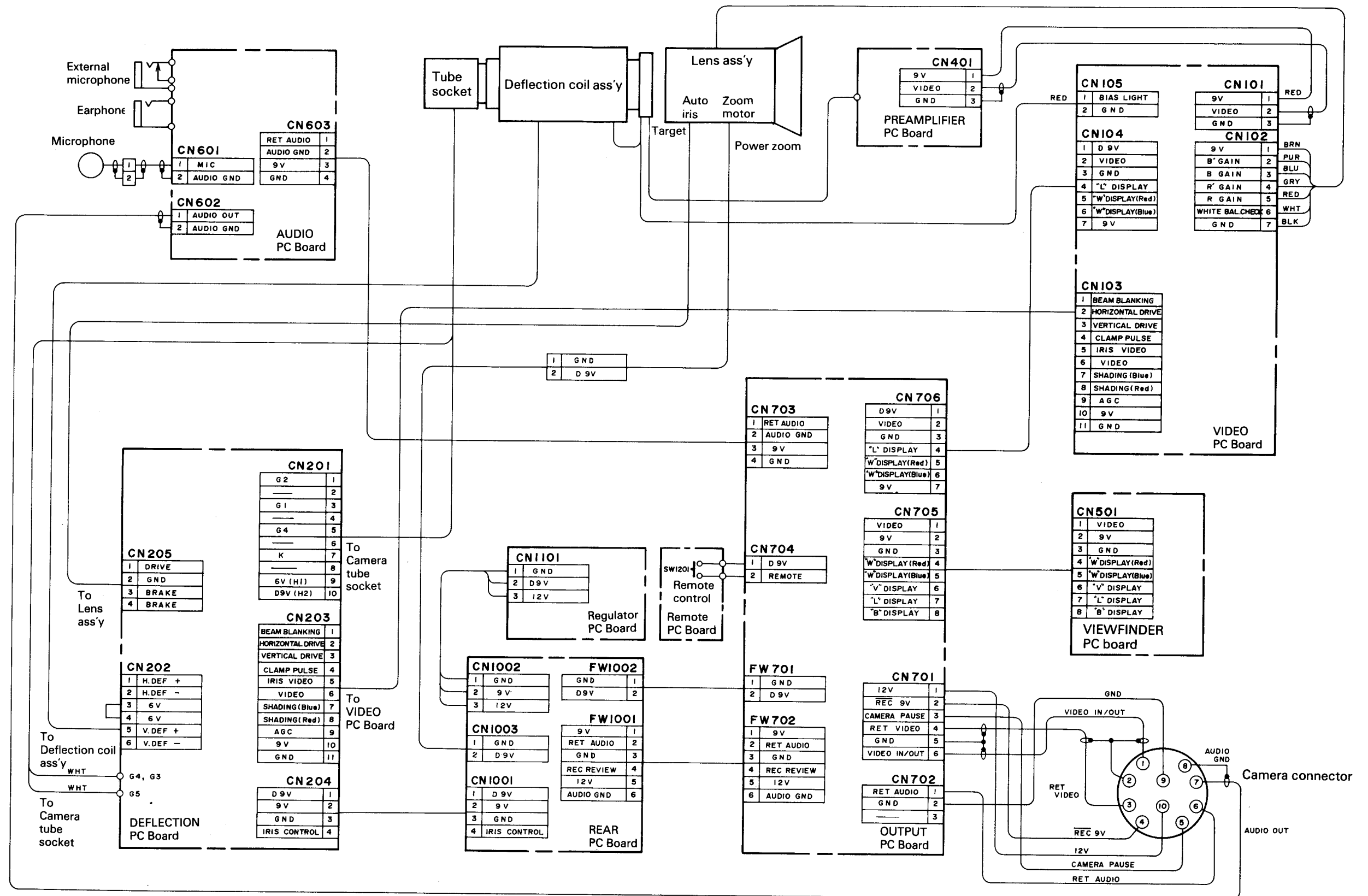
2. High voltages may be applied to ICs due to leakage from the soldering iron during soldering, so be sure to ground the tip of the soldering iron or use a low voltage soldering iron.
3. The human body and clothes made of chemical fibre, nylon gloves, etc., may be charged to several thousand volts due to friction, so be sure to ground body during work.
4. Be sure to ground measuring instruments such as the oscilloscope, VTVM, etc., which are used for repairs, before starting work.

< Capacitors >

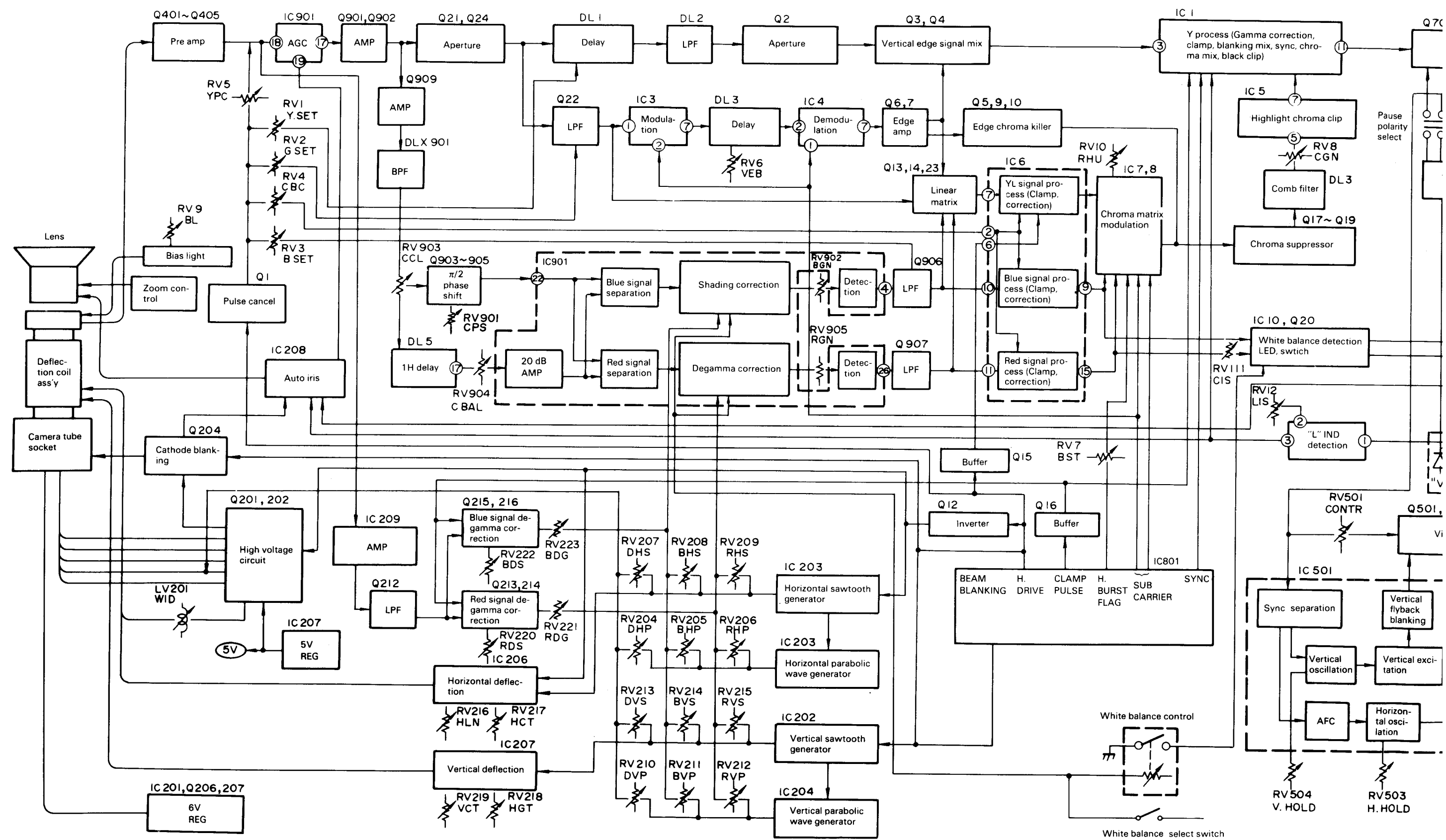
	Unit indication	No indication μF P PF
	Withstand voltage indication	No indication 50 WV (Those other than 50 WV and electrolytic capacitor are indicated in the diagram. WV omitted.)
	Tolerance indication	No indication $\pm 10\%$ J $\pm 5\%$ M $\pm 20\%$ C ± 0.25 PF Z +80 -20% (Tolerance is not indicated for electrolytic capacitors (excluding tantalum capacitors, high-stability electrolytic capacitors)).
	Type indication	No indication Ceramic capacitor Ordinary electrolytic capacitor (Refer to the circuit symbol to discriminate between ceramic capacitor) ML Mylar (polyester film) STY Styrol TA Tantalum KU High-stability electrolytic capacitor MP Metalized paper
Example C210 0.1/25 MYL J Mylar, 0.1 μF , 25 WV, $\pm 5\%$		

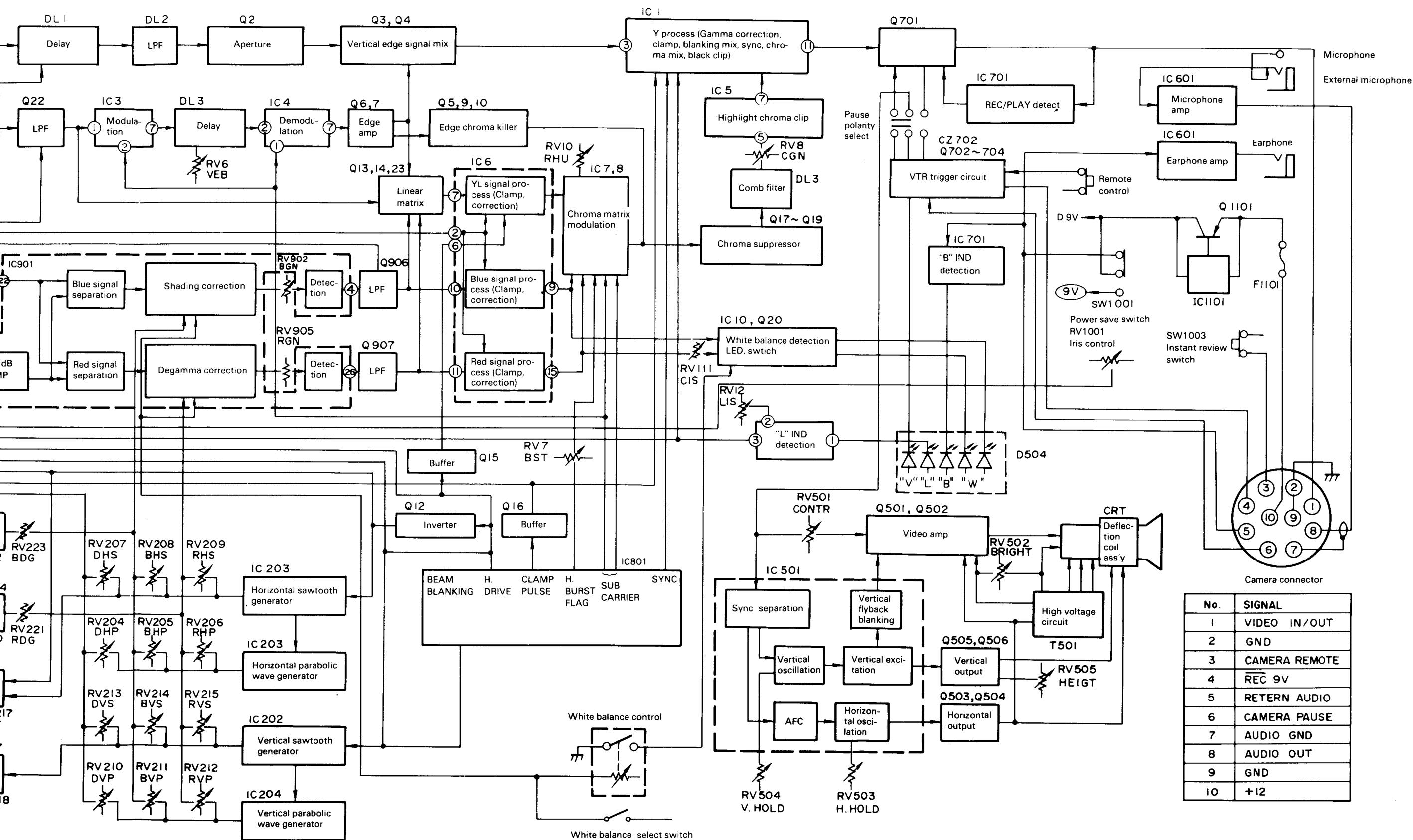
- Note: 1. Voltages are based on the values during normal operation, during no signal, (–) side of the power supply.
2. Unit, withstand voltage (power capacitance), tolerance and type of the resistors (excluding variable resistors) and capacitors are indicated with abbreviation in the circuit diagram. It is requested to replace the parts correctly matching the abbreviation in the diagram with the list showing how to read the abbreviation.

CIRCUIT BOARD CONNECTION DIAGRAM



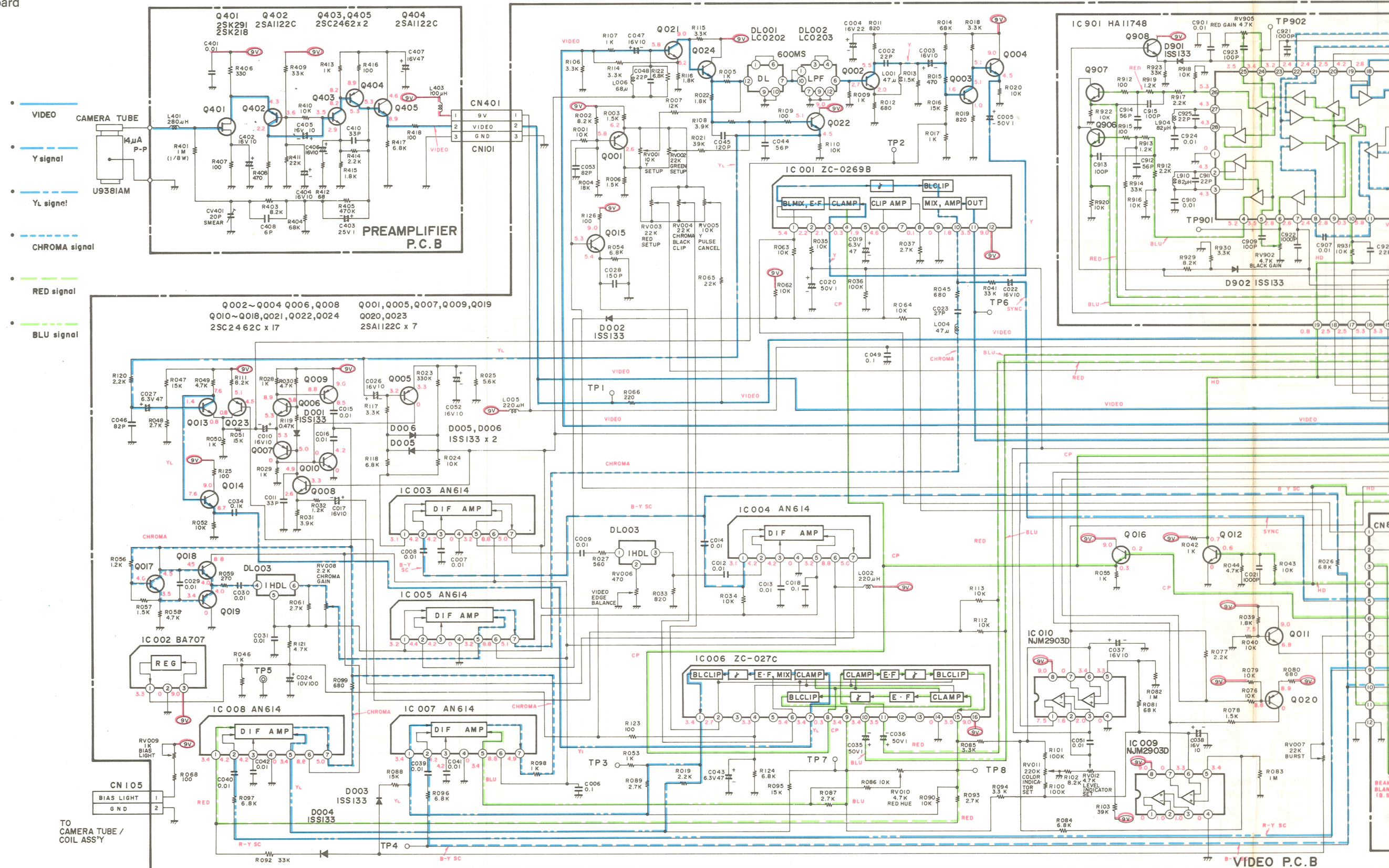
BLOCK DIAGRAM



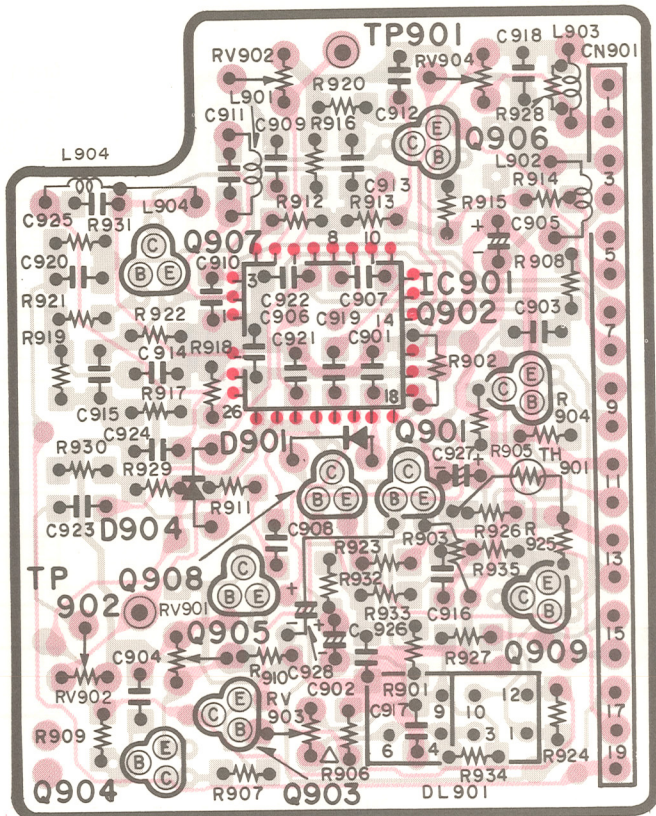


VIDEO CIRCUIT DIAGRAM

Circuit board composition
Video board
Preamplifier board
Chroma board



CHROMA CIRCUIT BOARD The circuit No. is "9xx". Adding "900" to the number marked on the board makes it the same as the number shown in the reference manual.



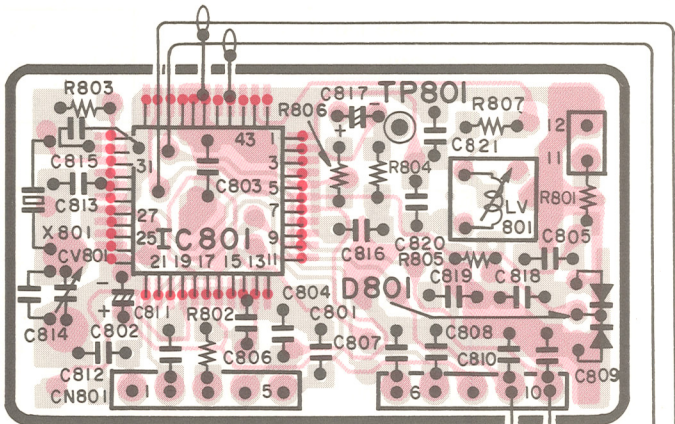
CHROMA P.C.B

Note: Indication ●: Parts are connected to the pattern on the parts side.
Resistors without Δ show chip parts.
Transistors indicated with the shape  are chip parts.

Connect CN901 to the video board

	IC901	CN901
1	0V	2.4V
2	4.3V	2.4V
3	4.3V	2.1V
4	5.2V	2.1V
5	3.5V	
6	2.8V	4.5V
7	2.6V	4.5V
8	2.4V	4.5V
9	2.8V	3.2V
10	0.3V	2.6V
11	5.8V	8.5V
12	5.9V	2.7V
13	0V	0V
14	2.4V	4.5V
15	2.4V	3.3V
16	8.7V	5.3V
17	6.2V	2.5V
18	2.8V	2.5V
19	4.2V	0.8V
20	2.5V	
21	2.4V	
22	3.2V	
23	3.4V	
24	3.5V	
25	5.3V	
26	4.3V	
27	4.3V	

SSG CIRCUIT BOARD The circuit No. is "8xx". Adding "800" to the number marked on the board makes it the same as the number indicated in the reference manual.



SSG P.C.B

Note: Indication ●: Parts are connected to the pattern on the parts side.
Connect CN801 to the video board

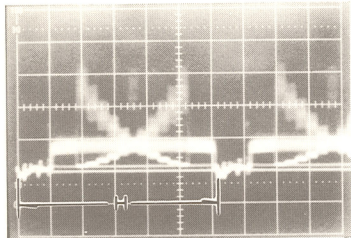
CN801

1	5.3V
2	0.5V
3	5.7V
4	5.3V
5	6.1V
6	0.2V
7	0.3V
8	7.0V
9	2.8V
10	2.8V
12	6.5V
13	0V

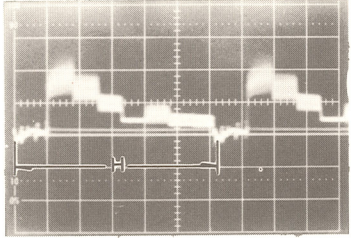
● Video circuit waveforms

CN101

CN101-2
0.05V/div, 10 μs/div

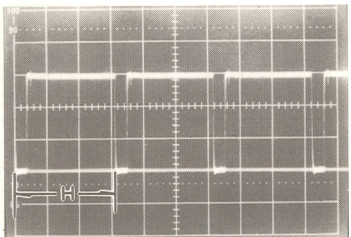


CN101-2
50mV/div, 10 μs/div

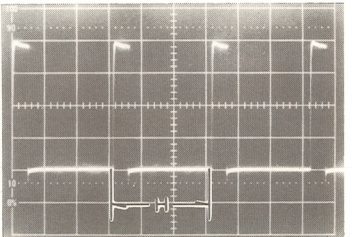


CN103

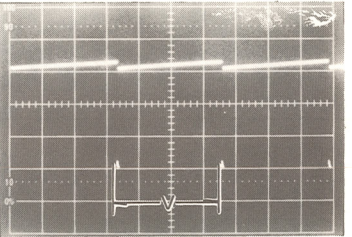
CN103-1
2V/div, 20 μs/div



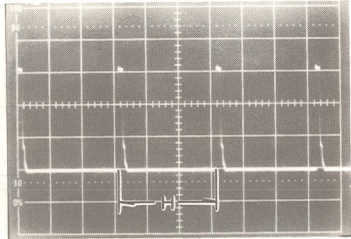
CN103-2
2V/div, 20 μs/div



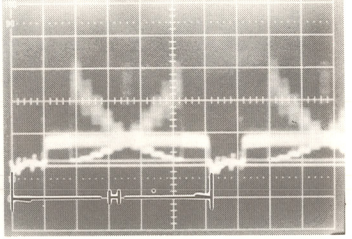
CN103-3
2V/div, 5ms/div



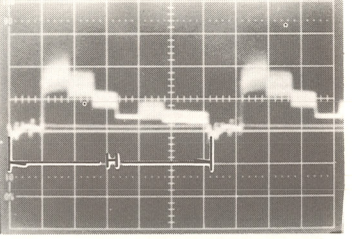
CN103-4
2V/div, 20 μs/div



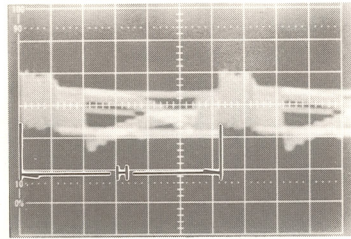
CN103-6
50mV/div, 10 μs/div



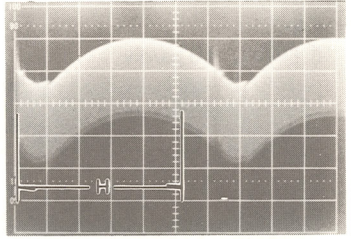
CN103-6
50mV/div, 10 μs/div



CN103-7
50mV/div, 10 μs/div

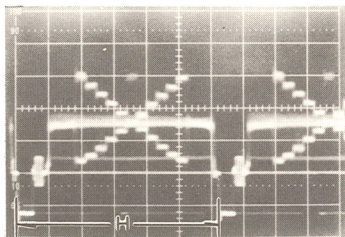


CN103-8
50mV/div, 10 μs/div



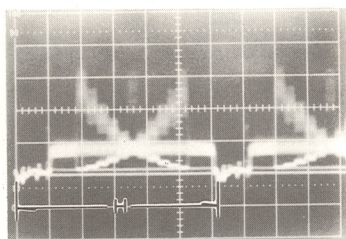
CN104

CN104-2
0.5V/div, 10 μ s/div

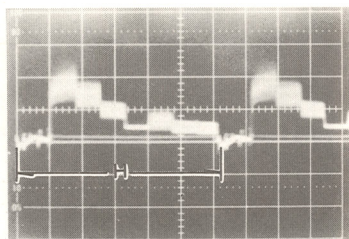


Test point

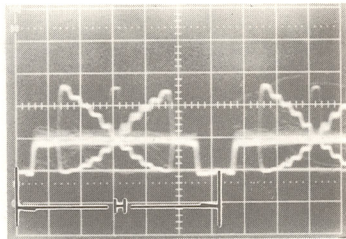
TP 1
50mV/div, 10 μ s/div



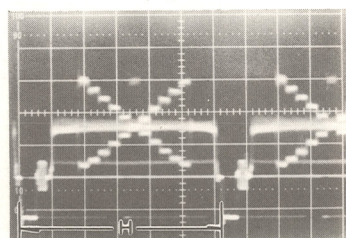
TP 1
50mV/div, 10 μ s/div



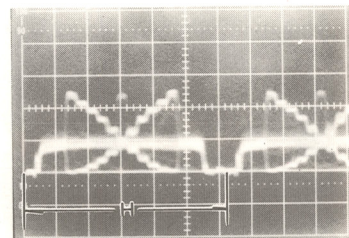
TP 3
0.2V/div, 10 μ s/div



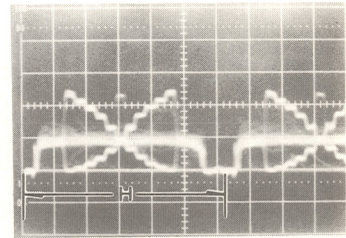
TP 6
0.5V/div, 10 μ s/div



TP 7
0.2V/div, 10 μ s/div

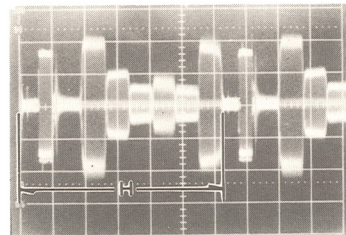


TP 8
0.2V/div, 10 μ s/div

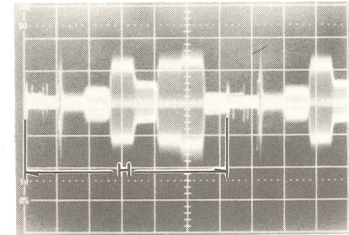


IC

IC7-7
0.5V/div, 10 μ s/div

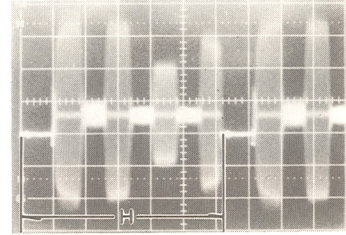


IC8-7
0.5V/div, 10 μ s/div

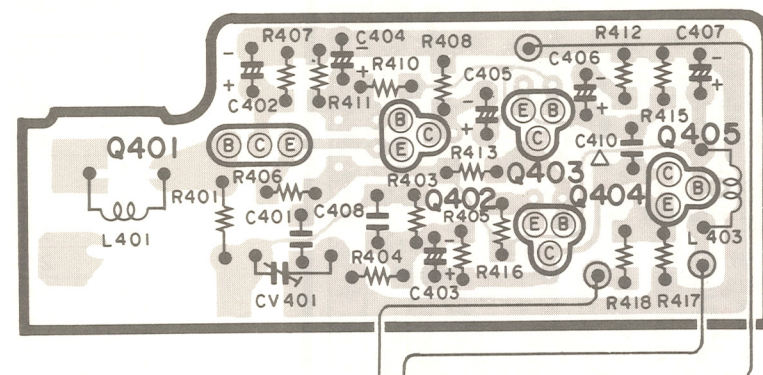


● Chroma board waveform

TP901
0.1V/div, 10 μ s/div



PREAMPLIFIER CIRCUIT BOARD The circuit no. is "4". Adding "400" to the number marked on the board makes it the same as the number indicated in the reference manual.



Note: Capacitors without mark Δ show chip parts.
(Excluding electrolytic capacitors)

Note: Transistors shown with the shape

are chip parts.

1	9V
2	VIDEO
3	GND

CN401

PREAMPLIFIER P.C.B

VIDEO CIRCUIT BOARD

CN101

1	9V
2	VIDEO
3	GND

To preamplifier CN401

CN102

1	9V
2	B' GAIN
3	B GAIN
4	R' GAIN
5	R GAIN
6	WHITE BAL. CHECK
7	GND

To lens (white balance)

CN103

1	BEAM BLANKING
2	H. DRIVE
3	V. DRIVE
4	CLAMP PULSE
5	IRIS VIDEO
6	VIDEO
7	SHADING(Blue)
8	SHADING(Red)
9	AGC
10	9V
11	GND

To deflection circuit
CN203

CN104

1	D9V
2	VIDEO
3	GND
4	"L" DISPLAY
5	"W" DISPLAY(Red)
6	"W" DISPLAY (Blue)
7	9V

To output circuit
CN706

CN105

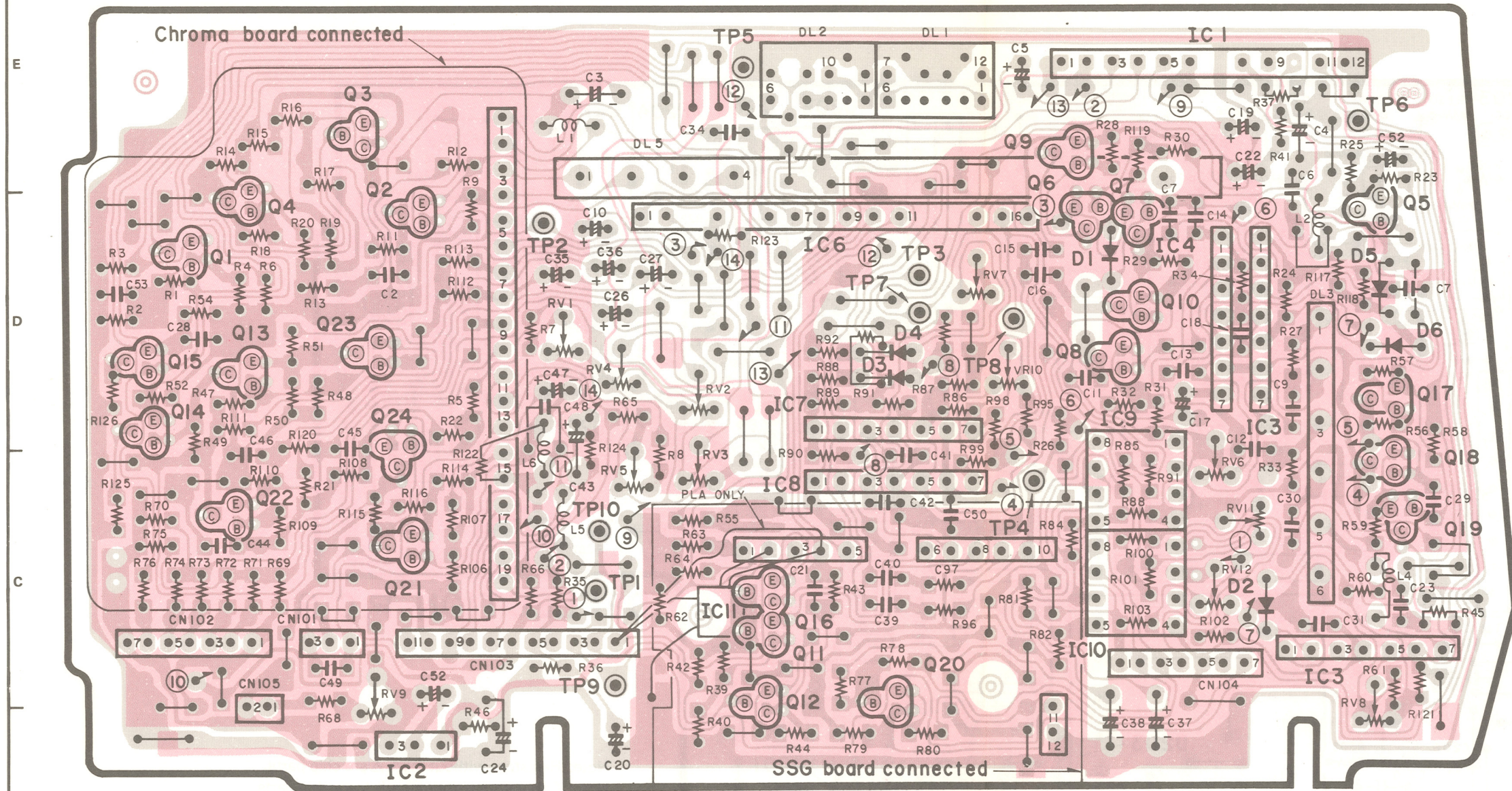
1	BIAS LIGHT
2	GND

To camera tube/coil
ass'y (Bias light)

IC2

1	3.3V
2	0V
3	9.0V

	IC3, 4	IC5	IC7	IC8
1	3.1V	3.2V	3.4V	3.4V
2	4.2V	4.4V	4.2V	4.2V
3	4.2V	4.2V	4.2V	4.2V
4	0V	0V	0V	0V
5	3.2V	3.2V	3.4V	3.4V
6	8.8V	8.8V	8.8V	8.8V
7	5.0V	5.1V	4.9V	5.0V



VIDEO P.C.B

Numbers ① ~ ⑪ shown the internal wiring.
Following the direction of the arrow →, a number and indication ← are found. These are to be connected.

Note: Transistors shown with the shape  are chip parts.

IC1

1	5.4V
2	2.2V
3	2.1V
4	0.3V
5	1.9V
6	4.6V
7	—
8	0.1V
9	0V
10	1.8V
11	3.5V
12	9.0V

IC6

1	3.4V
2	2.7V
3	—
4	3.3V
5	—
6	5.4V
7	3.4V
8	0.3V
9	3.4V
10	3.4V
11	3.5V
12	—
13	—
14	0V
15	3.4V
16	9.0V

IC9

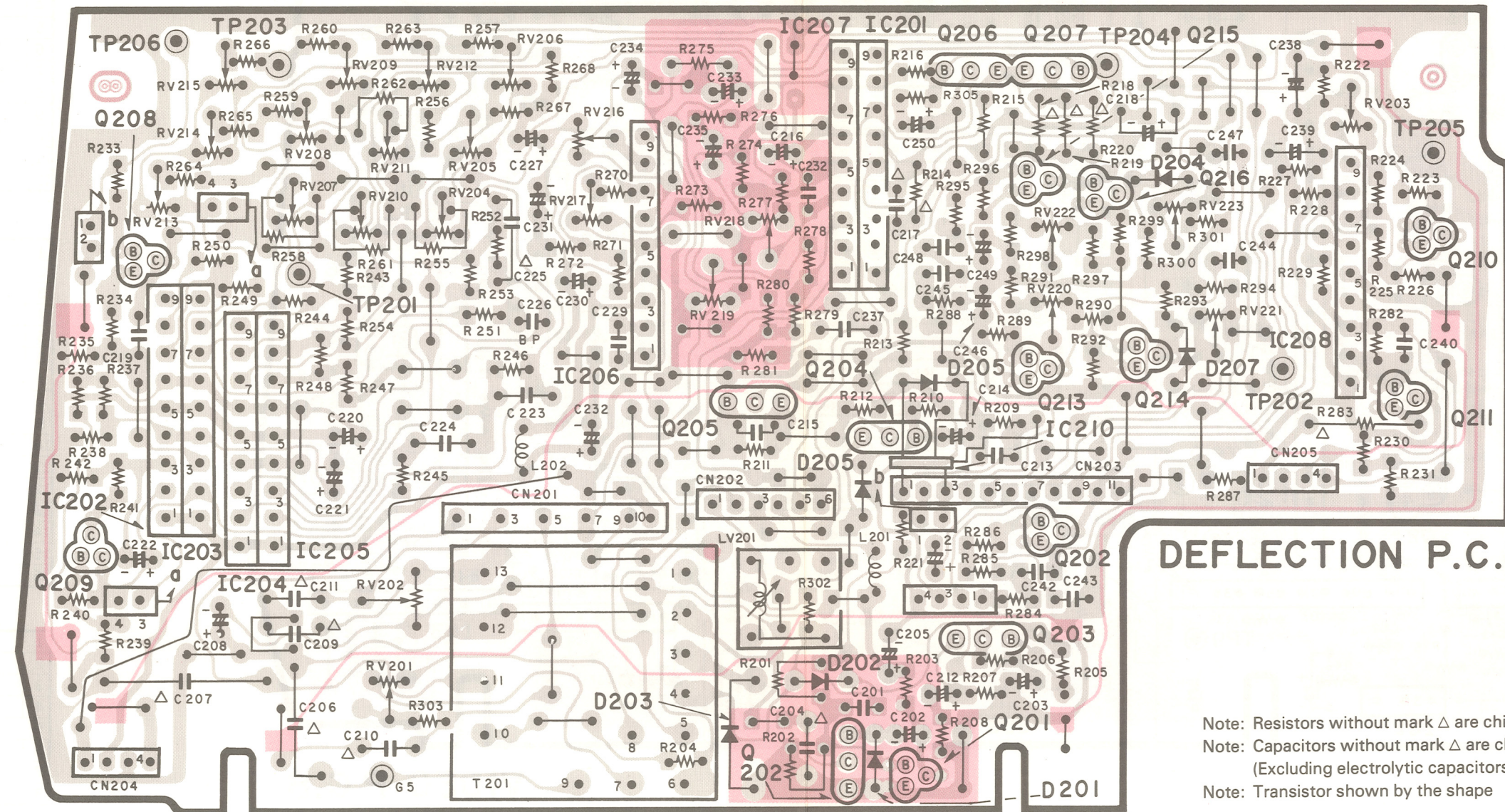
1	0V
2	1.0V
3	1.0V
4	0V
5	3.4V
6	3.3V
7	0V
8	9.0V

IC10

1	7.5V
2	1.6V
3	2.0V
4	0V
5	3.3V
6	3.4V
7	0V
8	9.0V

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23
B	5.8V V	2.7V	1.6V	5.1V	3.2V	5.8V	5.0V	3.3V	8.8V	0V	1.5V	0.6V	1.4V	7.6V	5.3V	0.2V	4.0V	4.5V	3.4V	8.8V	5.8V	5.1V	4.5V
C	2.6V V	5.5V	5.1V	9.0V	0V	8.9V	0V	4.9V	8.5V	4.2V	9.0V	0.7V	7.6V	9.0V	9.0V	9.0V	4.5V	8.8V	.0V	0V	9.0V	9.0V	0.8V
E	6.2V	2.0V	1.0V	4.5V	3.3V	5.3V	5.3V	2.6V	9.0V	0V	6.8V	0V	0.8V	6.7V	5.4V	0.3V	3.5V	4.0V	4.0V	8.9V	5.2V	4.5V	5.1V

DEFLECTION CIRCUIT BOARD The circuit No. is "2xx". Adding "200" to the number marked on the board makes it the same as the number shown in the reference manual?



DEFLECTION P.C.B

Note: Resistors without mark Δ are chip parts.
 Note: Capacitors without mark Δ are chip parts.
 (Excluding electrolytic capacitors)
 Note: Transistor shown by the shape  are chip parts.

	IC201	IC202	IC203	IC204	IC205	IC206	IC207	IC208
1	9.0V	9.0V	9.0V	9.0V	4.7V	7.8V	9.0V	9.0V
2	8.6V	5.3V	4.9V	4.7V	4.7V	5.0V	4.9V	3.2V
3	1.1V	2.2V	2.2V	4.7V	4.7V	9.0V	9.0V	5.0V
4	1.4V	2.2V	2.2V	4.7V	4.7V	4.4V	4.4V	5.0V
5	.0V	0V	0V	0V	0V	0V	0V	0V
6	6.0V	4.7V	4.7V	4.7V	4.7V	5.0V	4.9V	2.0V
7	6.0V	4.7V	4.7V	4.7V	4.7V	4.9V	4.9V	2.0V
8	5.4V	4.1V	4.4V	4.7V	4.7V	4.9V	5.0V	5.3V
9	9.0V	9.0V	9.0V	9.0V	9.0V	8.9V	9.0V	9.0V

	Q201	Q202	Q203	Q204	Q205	Q206	Q207	Q208
B	0.2V	0.5V	5.4V	-48.6V	-42.1V	5.4V	5.4V	0.8V
C	1.6V	0.5V	18.0V	-42.6V	-40.8V	8.9V	0.7V	4.9V
E	0V	0V	4.8V	-49.1V	-42.6V	6.0V	6.0V	2.5V

	IC209
1	5.3V
2	9.0V
3	2.3V
4	0V

	Q209	Q210	Q211	Q212	Q213	Q214	Q215	Q216
B	5.6V	2.0V	3.2V	5.2V	4.9V	5.5V	5.1V	5.8V
C	2.1V	2.0V	9.0V	9.0V	5.5V	2.7V	5.8V	2.5V
E	5.3V	0V	2.6V	4.6V	5.2V	6.1V	5.4V	6.4V

CN201

1	G2
2	—
3	G1
4	—
5	G4
6	—
7	K
8	—
9	6V
10	D9V

To camera tube socket

CN203

1	BEAM BLANKING
2	H. DRIVE
3	V. DRIVE
4	CLAMP PULSE
5	IRIS VIDEO
6	VIDEO
7	SHADING(Blue)
8	SHADING(Red)
9	AGC
10	9V
11	GND

To video board CN103

CN202

1	H. DEF⊕
2	H. DEF⊖
3	6V
4	6V
5	V. DEF⊕
6	V. DEF⊖

To deflection coil ass'y

CN204

1	D9V
2	9V
3	GND
4	IRIS CONT

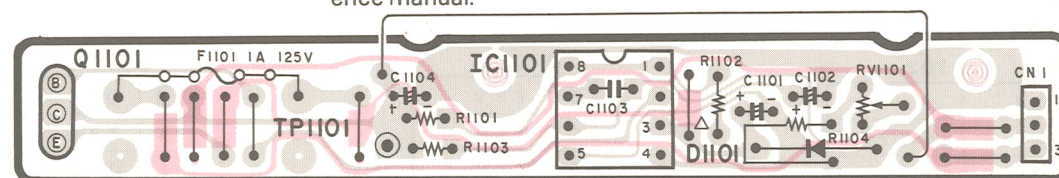
To rear circuit CN1001

CN205

1	DRIVE
2	GND
3	BRAKE
4	BRAKE

To Lens ass'y (Audio iris)

REGULATOR CIRCUIT BOARD The circuit No. is "11xx". Adding "1100" to the number marked on the board makes it the same as the number shown in the reference manual.

**REGULATOR P.C.B**

Note: Resistors without mark Δ are chip parts.

IC1101

1	2	3	4	5	6	7	8
4.2V	12.8V	13.5V	0V	1.8V	1.8V	4.9V	4.2V

CN1101

1	GND
2	D9V
3	12V

To rear circuit CN1002

Q1101

B	12.8V
C	9.0V
E	13.5V

The circuit No. is "10xx". Adding "1000" to the number marked on the board makes it the same as the number shown in the reference manual.

CN1001

1	D9V
2	9V
3	GND
4	IRIS CONT.

To deflection circuit CN204

CN1002

1	GND
2	D9V
3	12V

To regulator circuit CN1101

CN1003

1	GND
2	9V

To lens ass'y (Zoom motor)

FW1001

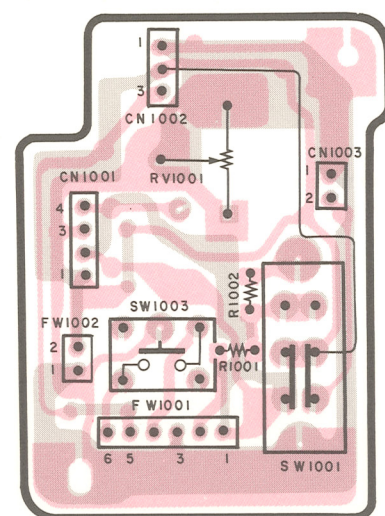
1	9V
2	RET AUDIO
3	GND
4	REC REVIEW
5	12V
6	AUDEO GND

To output circuit FW702

FW1002

1	GND
2	D9V

To output circuit FW701

REAR CIRCUIT BOARD**REAR P.C.B**

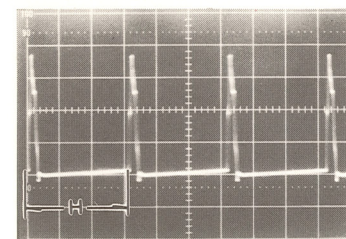
Note: Resistors without mark Δ are chip parts.

● Deflection circuit waveforms

CN202

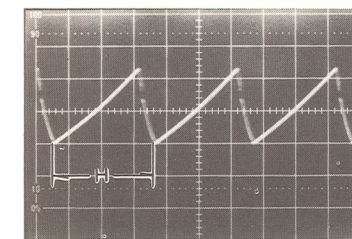
CN202-1

10V/div, 20 μs/div



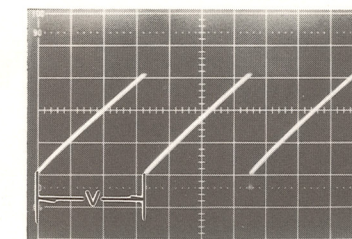
CN202-2

1V/div, 20 μs/div



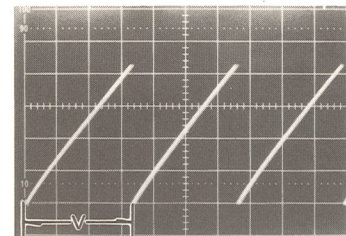
CN202-5

1V/div, 5 ms/div



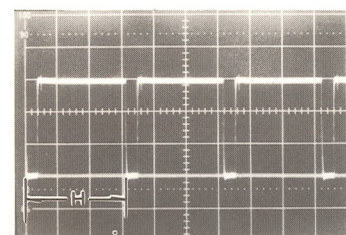
CN202-6

0.1V/div, 5 ms/div



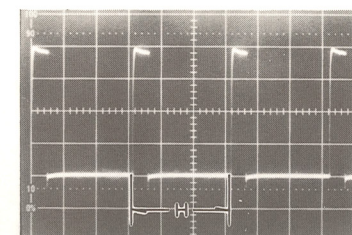
CN203-1

2V/div, 20 μs/div



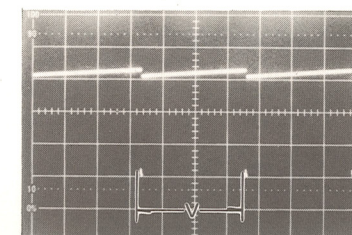
CN203-2

2V/div, 20 μs/div



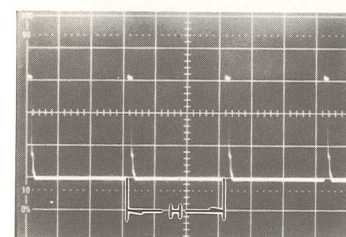
CN203-3

2V/div, 5 ms/div



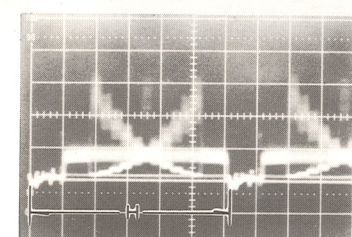
CN203-4

2 V/div, 20 μs/div



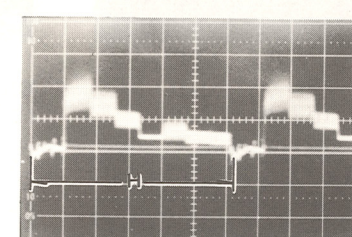
CN203-6

50mV/div, 10 μs/div

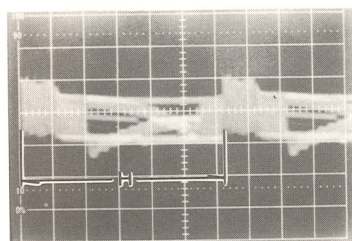


CN203-6

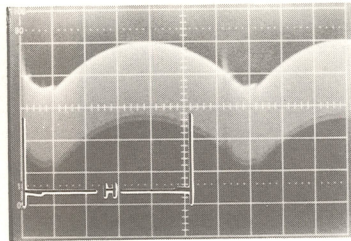
50mV/div, 10 μs/div



CN203-7
50mV/div, 10 μ s/div

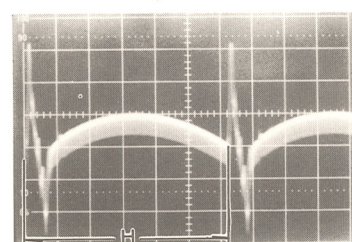


CN203-8
50mV/div, 10 μ s/div

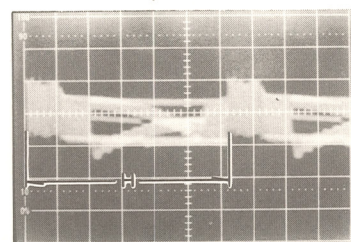


Test points

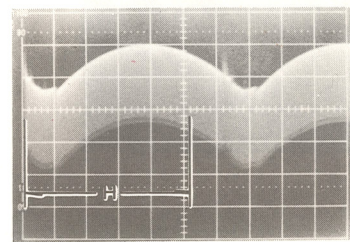
TP201
50mV/div, 10 μ s/div



TP202
50mV/div, 10 μ s/div

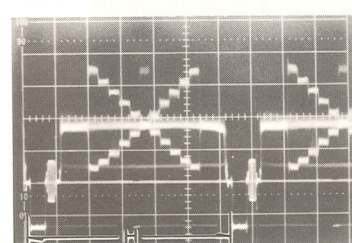


TP203
50mV/div, 10 μ s/div

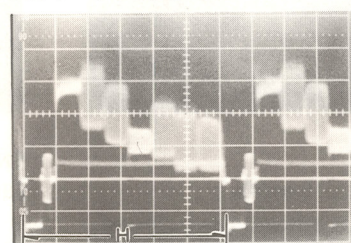


* Output circuit waveform

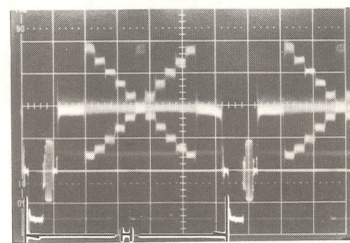
CN701-6
0.2V/div, 10 μ s/div



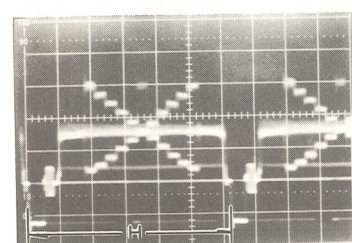
CN701-6
0.2V/div, 10 μ s/div



CN705-1
0.2V/div, 10 μ s/div



CN706-2
0.5V/div, 10 μ s/div



CN701		
1	12V	10
2	REC 9V	4
3	CAMERA PAUSE	6
4	RET. VIDEO	3
5	GND	2
6	VIDEO IN/OUT	1

Camera connector

CN703		
1	RET. AUDIO	
2	AUDIO GND	
3	9V	
4	GND	

Audio circuit
CN603

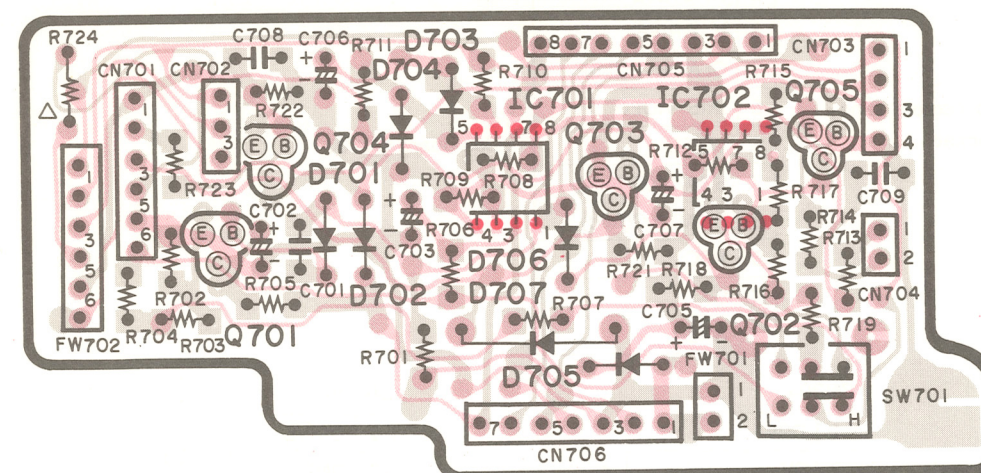
CN702		
1	RET. AUDIO	5
2	GND	9
3		

CN704		
1	D9V	
2	REMOTE	

To trigger
switch circuit
(SW1201)

OUTPUT CIRCUIT BOARD

The circuit No. is "7xx". Adding "700" to the number marked on the board makes it the same as the number shown in the reference manual.



OUT PUT P.C.B

Note: Indication ●: Parts are connected to the pattern on the parts side

Note: Resistor without mark Δ are chip parts

Note: Transistors shown with the shape  are chip parts

IC 701		IC 702
1	3.2 V	
2	1.0 V	7.8V(7.8V)
3	2.3 V	0V(7.2V)
4	0 V	
5	0.6 V	0V(0V)
6	0 V	8.3V(8.3V)
7	6.4 V	0V(7.6V)
8	8.3 V	

Q 701	
B	2.6 V
C	7.4 V
E	2.0 V

Q 705	
B	0V(0.6V)
C	7.8V(0V)
E	0V(0V)

	Q 702	Q 703	Q 704
B	0V(0.6V)	0V(0.6V)	0.6V(0V)
C	8.0V(0V)	7.8V(0V)	0V(7.6V)
E	0V(0V)	0V(0V)	0V(0V)

CN705

1	VIDEO
2	9V
3	GND
4	"W" DISPLAY(Red)
5	"W" DISPLAY(Blue)
6	"V" DISPLAY
7	"L" DISPLAY
8	"B" DISPLAY

To viewfinder
CN501

CN706

1	D9V
2	VIDEO
3	GND
4	"L" DISPLAY
5	"W" DISPLAY(Red)
6	"W" DISPLAY(Blue)
7	9V

To video circuit
CN104

FW701

1	GND
2	D9V

To rear circuit
FW1002

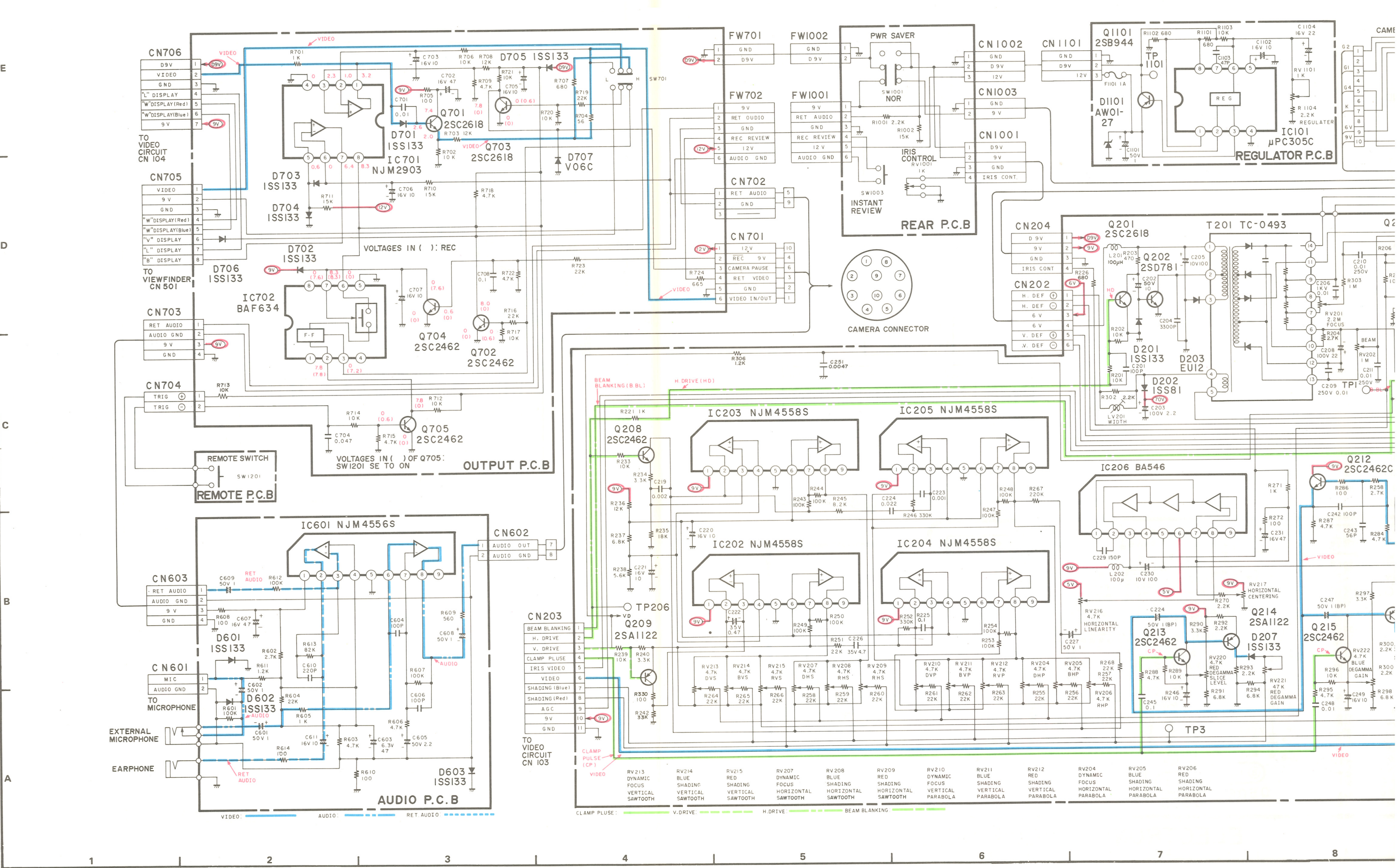
FW701

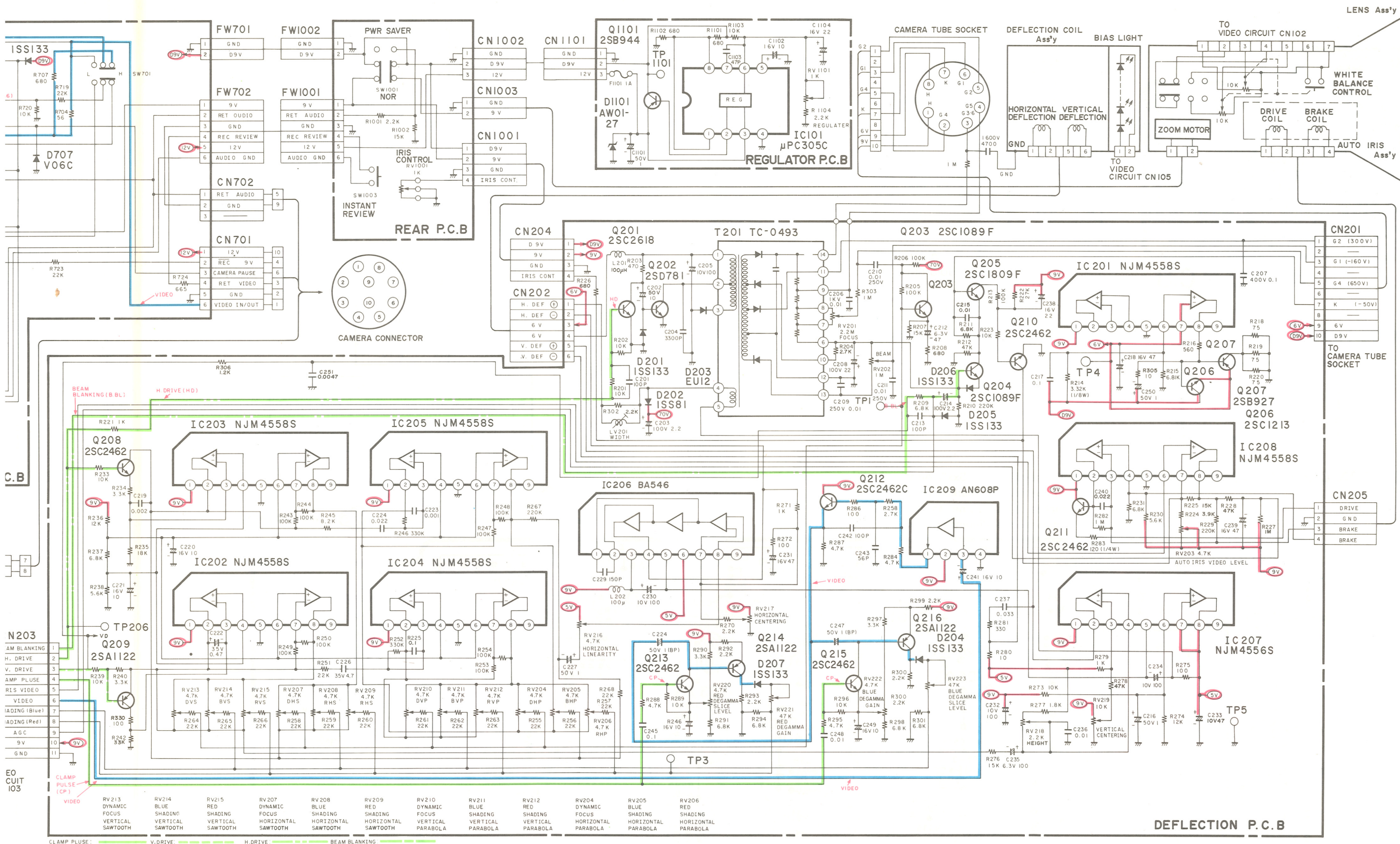
1	9V
2	RET. AUDIO
3	GND
4	REC REVIEW
5	12V
6	AUDIO GND

To rear circuit
FW1001

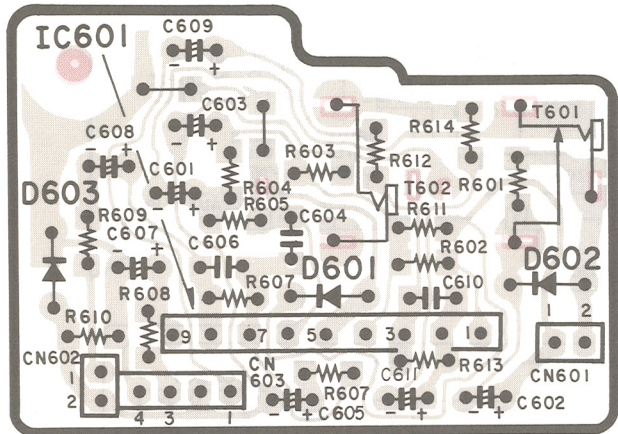
DEFLECTION CIRCUIT DIAGRAM

Circuit board composition: Deflection board, output board, audio board, rear board, regulator board remote board



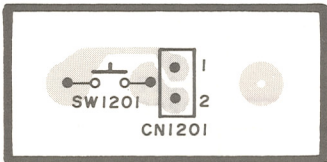


AUDIO CIRCUIT BOARD The circuit No. is "6xx". Adding "600" to the number marked on the board makes it the same as the number shown in the reference manual.

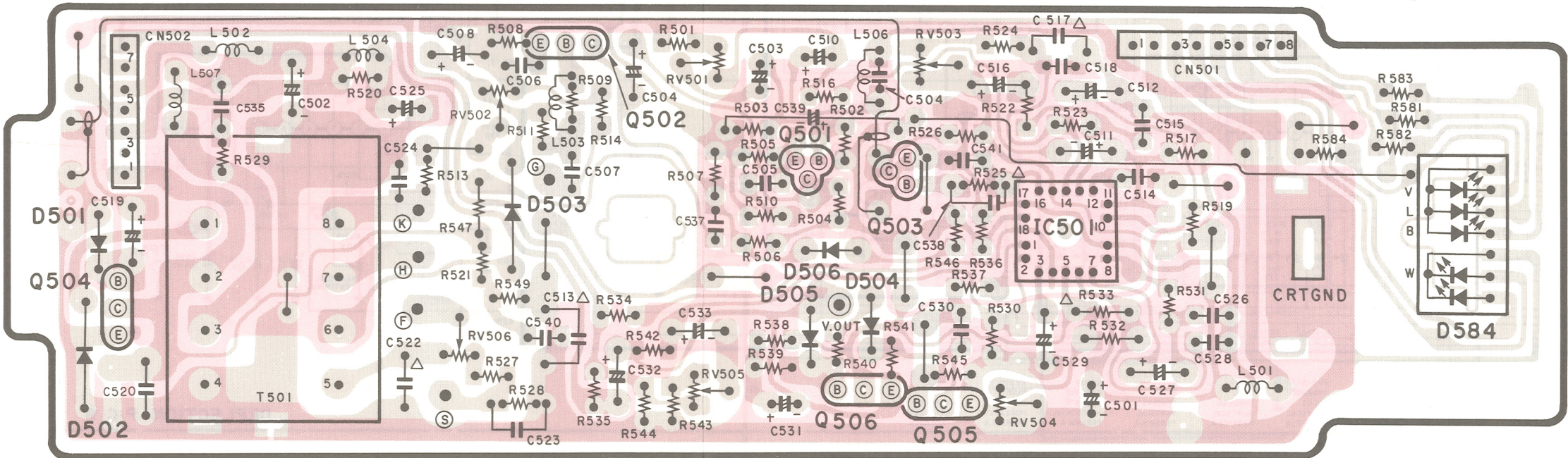


AUDIO P.C.B

REMOTE CIRCUIT BOARD



ELECTRONIC VIEWFINDER CIRCUIT BOARD The circuit No. is "5xx". Adding "500" to the number marked on the board makes it the same as the number shown in the reference manual.



ELECTRONIC VIEWFINDER P.C.B

IC601	
1	8.0V
2	5.2V
3	5.2V
4	5.2V
5	0V
6	4.7V
7	5.2V
8	5.2V
9	8.0V

CN601	
1	MIC
2	AUDIO GND

To microphone

CN602		
1	AUDIO OUT	7
2	AUDIO GND	8

To camera connector

CN603	
1	RET. AUDIO
2	AUDIO GND
3	9V
4	GND

To output circuit CN703

CN501	
1	VIDEO
2	9V
3	GND
4	"W" DISPLAY(Red)
5	"W" DISPLAY(Blue)
6	"V" DISPLAY
7	"L" DISPLAY
8	"B" DISPLAY

Output board
CN705

IC501	
1	1.1V
2	3.1V
3	5.4V
4	2.9V
5	8.8V
6	3.4V
7	3.4V
8	0.6V
9	0V
10	2.2V
11	2.0V
12	2.3V
13	4.7V
14	4.6V
15	8.8V
16	1.6V
17	0V
18	0.1V

	Q501	Q502	Q503	Q504	Q505	Q506
B	1.8V	3.5V	0V	0.2V	0.7V	4.4V
C	4.3V	17.3V	0.9V	0.8V	3.7V	8.8V
E	1.2V	2.9V	0V	0V	0V	3.8V

Note: Capacitors without mark Δ are chip parts.
(Excluding electrolytic capacitor)

Note: Transistors shown with the shape  are chip parts.

ELECTRONIC VIEWFINDER CIRCUIT DIAGRAM

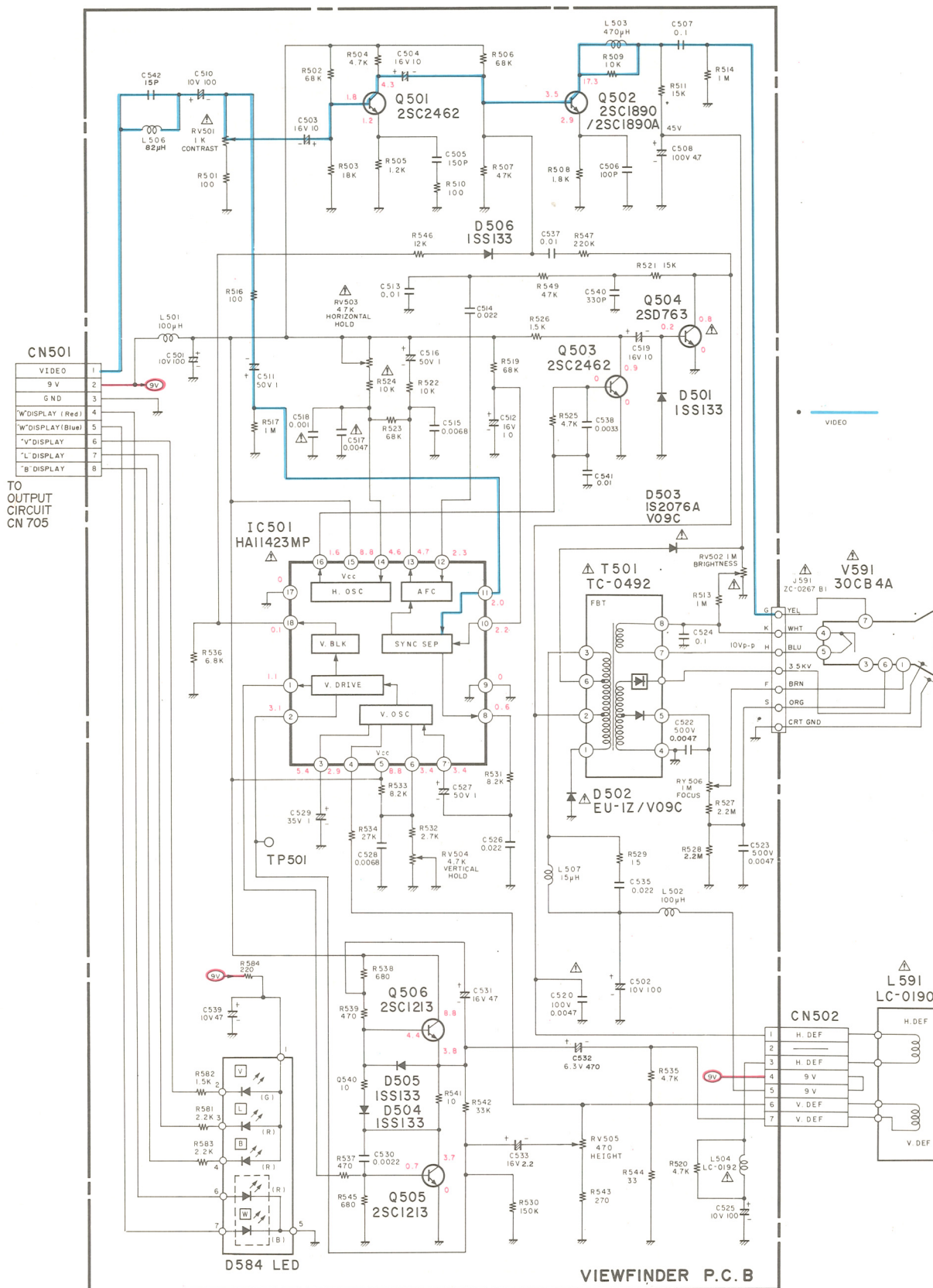
E

D

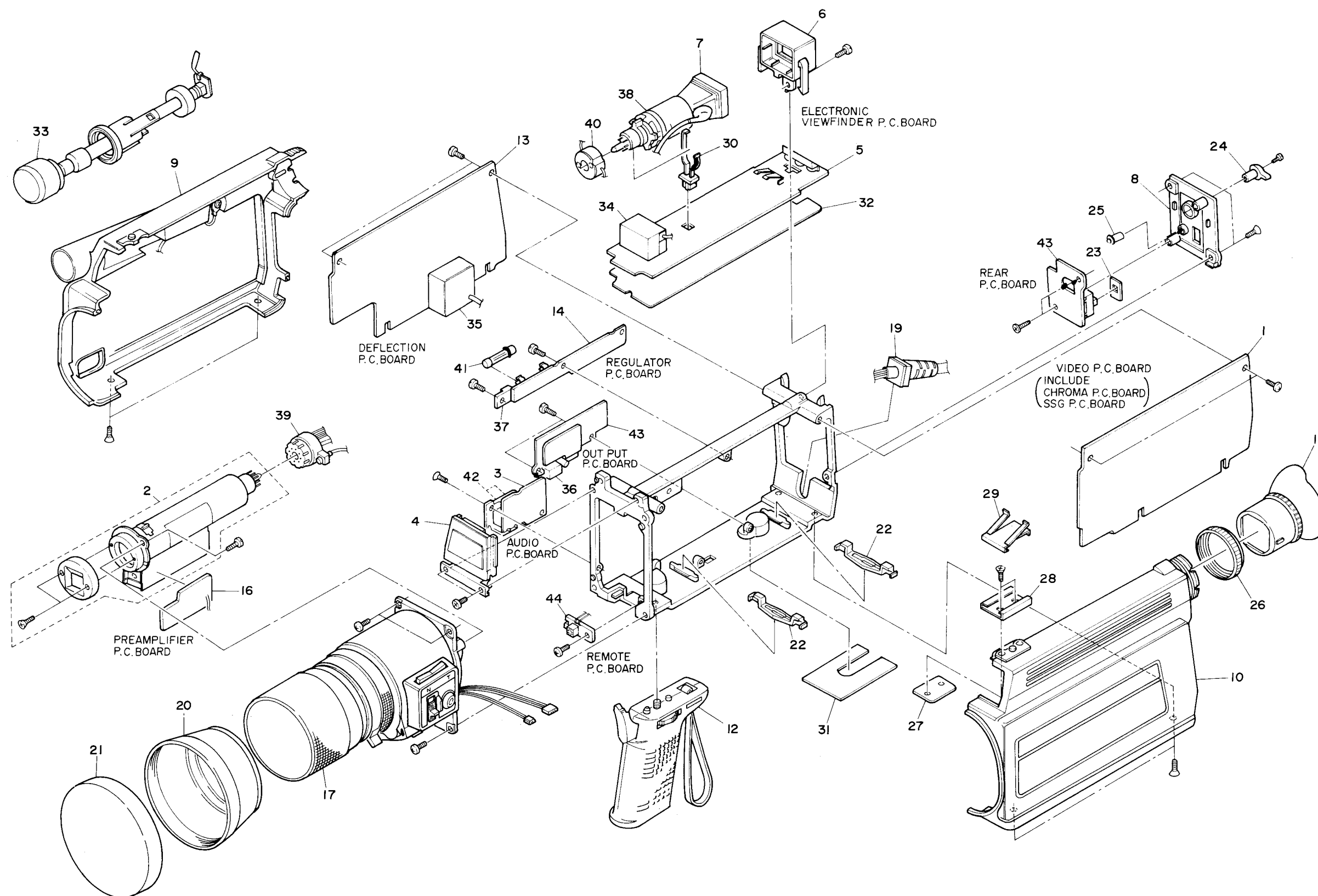
C

B

A

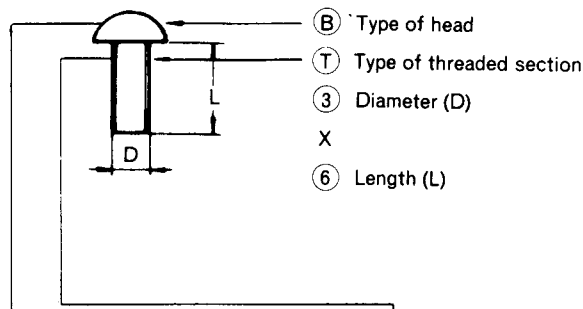


EXPLODED VIEW



REPLACEMENT PARTS LIST

SYMBOL-NO	P-NO	DESCRIPTION	SYMBOL-NO	P-NO	DESCRIPTION
MISCELLANEOUS			25	6065011	BUTTON
1	5997754	VIDEO PCB ASSEMBLY	26	6872561	LOCK LING
2	5310894	SATICON	27	7381781	SHOE-NUT
3	6872663	AUDIO PCB ASSEMBLY	28	7381771	SHOE
4	6872711	VF PCB HOLDER ASSEMBLY	29	6536681	SPRING
5	5951932	VF PCB ASSEMBLY	30	6536691	CRT-COVER
6	7381891	CRT HOLDER ASSEMBLY	31	4662421	PLATE
7	5310513	CRT	32	6872731	VF-PLATE
8	6208311	PANEL	33	5421871	MICRO PHONE
9	6872652	COVER (R)	34	5270941	TRANS FORMER
10	6020771	COVER (L)	35	5270257	TRANS FORMER
11	6978231	LENS HOLDER ASSEMBLY	36	5622531	SWITCH
12	6872641	CRIP ASSEMBLY	37	5323511	TRANSISTOR 2SB944R
13	5997763	DEF PCB ASSEMBLY	38	5272131	COIL
14	5997793	REG PCB ASSEMBLY	39	5653831	SOCKET
16	5997771	PRE AMP PCB ASSEMBLY	40	5659454	SOCKET
17	6959772	LENS	41	5721189	FUSE
19	5881583	CABLE	42	5672641	JACK
20	6873371	LENS FOOD	43	5952253	OUT REAR PCB ASSEMBLY
21	6873381	LENS CAP	44	5635101	TRIGER SWITCH ASSEMBLY
22	6872721	PCB HOLDER	45	7486721	COVER
23	6644021	SWITCH COVER	46	6978611	BRACKET
24	6293821	KNOB	47	6536911	CRT SPRING



						Washers and Nuts		
Abbreviation	Name	Shape	Abbreviation	Name	Shape	Abbreviation	Name	Shape
No. symbol	Brazier head		No. symbol	Machine (clamps without tapping)		W	Washer	
P	Pan head		t	Tapping (clamps with tapping) Type 1		SW	Spring washer	
B	Binding head		T	Tapping (clamps with tapping) Type 2		LW	Locking washer	
O	Oval countersunk head		f	Forming tight (for metal)		E	E-ring	
F	Flat countersunk head		Note Since the forming tight screw tightens while self-tapping, machine screws can be replaced by tapping screws			Note Internal dia is indicated for nuts and washers		
						N	Nut	

SYMBOL-NO	P-NO	DESCRIPTION	SYMBOL-NO	P-NO	DESCRIPTION
VIDEO P.C. BOARD			SSG P.C. BOARD		
RESISTORS			RESISTORS		
RV1	5007405	SEMI VARIABLE 10KOHM	CV1	5058411	TRIMMER 50PF
RV10	5007131	SEMI VARIABLE 4.7KB	SEMI-CONDUCTORS		
RV11	5007169	SEMI VARIABLE 220 KOHM	D1	5330771	DIODE 1SV55
RV12	5007131	SEMI VARIABLE 4.7KB	IC1	5365613	IC HD440072
RV2-4	5007166	SEMI VARIABLE 22 KOHM	COILS		
RV5	5007405	SEMI VARIABLE 10KOHM	LV1	5124141	COIL LC-0192
RV6	5007182	SEMI VARIABLE RESISTOR 4700HM	CRYSTALS		
RV7	5007166	SEMI VARIABLE 22 KOHM	X1	5780891	CRYSTAL
RV8	5007433	SEMI VARIABLE 2.2KOHM	CHROMA P.C. BOARD		
RV9	5007402	SEMI VARIABLE 2KOHM	CAPACITORS		
SEMI-CONDUCTORS			TH1	5340213	THERMISTOR 32D27
D1-6	5331592	DIODE 1SS133	RESISTORS		
IC1	5353511	IC IC-0269B	RV1	5007402	SEMI VARIABLE 2KOHM
IC2	5363291	IC BA707	RV2	5007131	SEMI VARIABLE 4.7KB
IC3-5	5351822	IC AN614	RV3	5007433	SEMI VARIABLE 2.2KOHM
IC6	5353521	IC IC-0270	RV4	5007402	SEMI VARIABLE 2KOHM
IC7-8	5351822	IC AN614	RV5	5007131	SEMI VARIABLE 4.7KB
IC9-10	5363272	IC NJM2903D	SEMI-CONDUCTORS		
Q1	5329761	MICRO PACKAGE TRANSISTOR 2SA1122CC	D1-2	5351592	IC LA2101
Q10-18	5329771	MICRO PACKAGE TRANSISTOR 2SC2462LC	IC1	5363281	IC HA11748MP
Q19-20	5329761	MICRO PACKAGE TRANSISTOR 2SA1122CC	Q1-4	5329771	MICRO PACKAGE TRANSISTOR 2SC2462LC
Q2-4	5329771	MICRO PACKAGE TRANSISTOR 2SC2462LC	Q5	5329761	MICRO PACKAGE TRANSISTOR 2SA1122CC
Q21-22	5329771	MICRO PACKAGE TRANSISTOR 2SC2462LC	Q6-9	5329771	MICRO PACKAGE TRANSISTOR 2SC2462LC
Q23	5329761	MICRO PACKAGE TRANSISTOR 2SA1122CC	COILS		
Q24	5329771	MICRO PACKAGE TRANSISTOR 2SC2462LC	L1	5152086	CHOKE COIL 82MICROH
Q5	5329761	MICRO PACKAGE TRANSISTOR 2SA1122CC	L2-3	5152076	CHOKE COIL 15MICROH
Q6	5329771	MICRO PACKAGE TRANSISTOR 2SC2462LC	L4	5152086	CHOKE COIL 82MICROH
Q7	5329761	MICRO PACKAGE TRANSISTOR 2SA1122CC	MISCELLANEOUS		
Q8	5329771	MICRO PACKAGE TRANSISTOR 2SC2462LC	DL1	5162401	FILTER LC-0208
Q9	5329761	MICRO PACKAGE TRANSISTOR 2SA1122CC	MISCELLANEOUS		
COILS			DL1	5162521	DELAY LINE LC-0202
L1	5152154	CHOKE COIL	DL2	5162531	DELAY LINE LC-0203
L2	5152032	PEAKING COIL 220 MICROH	DL3	5785237	DELAY LINE
L4	5152333	CHOKE COIL 47UH+-10%	DL5	5785236	DELAY LINE
L5	5152032	PEAKING COIL 220 MICROH			
L6	5152154	CHOKE COIL			

SYMBOL-NO	P-NO	DESCRIPTION	SYMBOL-NO	P-NO	DESCRIPTION
DEFLECTION P.C. BOARD			REGULATOR P.C. BOARD		
RESISTORS			RESISTORS		
RV1	5007174	VARIABLE RESISTOR 2.2MOHM	RV1	5007402	SEMI VARIABLE 2KOHM
RV17	5007405	SEMI VARIABLE 10KOHM	SEMI-CONDUCTORS		
RV18	5007433	SEMI VARIABLE 2.2KOHM	D1	2327079	DIODE AW01-27
RV19	5007405	SEMI VARIABLE 10KOHM	IC1	5352553	IC MPC3050
RV2	5007409	SEMI VARIABLE RESISTOR	Q1	5323511	TRANSISTOR 2SB944R
RV20	5007131	SEMI VARIABLE 4.7KB	MISCELLANEOUS		
RV21	5007188	SEMI VARIABLE RESISTOR 47KOHM	F1	5721189	FUSE
RV22	5007131	SEMI VARIABLE 4.7KB	AUDIO P.C. BOARD		
RV23	5007188	SEMI VARIABLE RESISTOR 47KOHM	SEMI-CONDUCTORS		
RV3-16	5007131	SEMI VARIABLE 4.7KB	D2-3	5331592	DIODE 1SS133
SEMI-CONDUCTORS			IC1	5363141	IC NJM4556S
D1	5331592	DIODE 1SS133	PREAMPLIFIER P.C. BOARD		
D2	5331001	DIODE 1SS81	RESISTORS		
D3	5332351	DIODE EU-12	CV401	5058411	TRIMMER 50PF
D4-7	5331592	DIODE 1SS133	SEMI-CONDUCTORS		
IC1-5	5350601	IC NJM4558D	Q401	5322981	TRANSISTOR 2SK291Q
IC6	5352431	IC BA546	Q402	5329761	MICRO PACKAGE TRANSISTOR 2SA1122CC
IC7	5363141	IC NJM4556S	Q403	5329771	MICRO PACKAGE TRANSISTOR 2SC2462LC
IC8	5350601	IC NJM4558D	Q404	5329761	MICRO PACKAGE TRANSISTOR 2SA1122CC
IC9	5351821	IC AN608P	Q405	5329771	MICRO PACKAGE TRANSISTOR 2SC2462LC
Q1	5329781	MICRO PACKAGE TRANSISTOR 2SC2618RC	COILS		
Q10-13	5329771	MICRO PACKAGE TRANSISTOR 2SC2462LC	L401	5152701	COIL LC-0199
Q14	5329761	MICRO PACKAGE TRANSISTOR 2SA1122CC	L403	5152354	COIL
Q15	5329771	MICRO PACKAGE TRANSISTOR 2SC2462LC	REMOTE P.C. BOARD		
Q16	5329761	MICRO PACKAGE TRANSISTOR 2SA1122CC	MISCELLANEOUS		
Q2	5322238	TRANSISTOR 2SD781	SW1	5622014	SWITCH
Q3-5	5322234	TRANSISTOR 2SC1890A-F	ELECTRONIC VIEWFINDER P.C. BOARD		
Q6	5323651	TRANSISTOR 2SC2274E	RESISTORS		
Q7	5323661	TRANSISTOR 2SB927S	RV501	5007402	SEMI VARIABLE 2KOHM
Q8	5329771	MICRO PACKAGE TRANSISTOR 2SC2462LC	RV502	5007409	SEMI VARIABLE RESISTOR
Q9	5329761	MICRO PACKAGE TRANSISTOR 2SA1122CC	RV503-504	5007131	SEMI VARIABLE 4.7KB
COILS			RV505	5007182	SEMI VARIABLE RESISTOR 4700HM
LV1	5120891	COIL LC-0200	RV506	5007409	SEMI VARIABLE RESISTOR
L1-2	5150619	COIL			
REAR P.C. BOARD					
MISCELLANEOUS					
SW1	5622013	SWITCH			
SW2	5633671	PUSH SWITCH			
VR1	5000942	VARIABLE RESISTOR 1KOHM(B)			

SYMBOL-NO	P-NO	DESCRIPTION	SYMBOL-NO	P-NO	DESCRIPTION
SEMI-CONDUCTORS					
D501	5331592	DIODE 1SS133			
D502	5332351	DIODE EU-12			
D503	5330132	DIODE 1S2076A			
D504-506	5331592	DIODE 1SS133			
D584	5381351	DIODE SLA-5631			
IC501	5363251	IC HA11423MP			
Q501	5329771	MICRO PACKAGE TRANSISTOR 2SC2462LC			
Q502	5322234	TRANSISTOR 2SC1890A-F			
Q503	5329771	MICRO PACKAGE TRANSISTOR 2SC2462LC			
Q504	5058414	TRIMER 20P			
Q505-506	5321785	TRANSISTOR 2SC1213CD			
COILS					
L501-502	5152354	COIL			
L503	5152036	CHOKE COIL 470MICRO H			
L504	5124141	COIL LC-0192			
L506	5152086	CHOKE COIL 82MICROH			
L507	5152131	CHOKE COIL 150K			
OUTPUT P.C. BOARD					
SEMI-CONDUCTORS					
D1-6	5331592	DIODE 1SS133			
D7	5330101	RECTIFIER SILICON V06C 15K			
IC1	5363272	IC NJM2903D			
IC2	5363261	IC BAF634			
Q1	5329781	MICRO PACKAGE TRANSISTOR 2SC2618RC			
Q2	5329771	MICRO PACKAGE TRANSISTOR 2SC2462LC			
Q3	5329781	MICRO PACKAGE TRANSISTOR 2SC2618RC			
Q4-5	5329771	MICRO PACKAGE TRANSISTOR 2SC2462LC			



TK

No. 1885E

VK-C830E

Technical Information

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

COLOR VIDEO CAMERA

April 1983

TOKAI WORKS

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Pickup system and camera tube list of differences between VK-C830 and VK-C800, 850

	VK-C830E	VK-C800	VK-C850
Pickup system			
Camera tube	U9381AM	H4115	H4100A
Sub-carrier frequency	4.43361875 MHz	3.6 MHz	4.3 MHz
Stripe filter angle	$\pm 27.35^\circ$	$\pm 23.1^\circ$	$\pm 23.2^\circ$
Camera tube size (inches)	1/2	2/3	2/3

Items shown above differ from the conventional frequency separation type camera. The other frequency separation items, features of SATICON and the temperature characteristics, etc., are the same as in conventional cameras.

Chapter 1. Function of zoom lens

1-1 Auto iris operation

Auto iris driving methods are divided into motor systems and galvanometer systems. The VK-C830 employs the latter from the viewpoint of compactness, light weight and low power consumption.

The galvanometer type iris operation is to move the coil by applying current to the driving coil inside the lens to open/close the iris.

The brake coil is provided to stabilize and smooth the iris opening/closing operation; the electromotive power corresponding to the position of the iron piece and speed is detected and amplified, and negative feedback is applied to the drive circuit by this. Fig. 1-1 shows the auto iris drive and control operation.

In Fig. 1-1 the video level is set by RV203 (AVL) with

the iris control (RV1001) set to its click position. In the circuit, the iris is set to the open direction as the voltage output from IC208 pin (7) gets higher. The video signal is controlled as follows:

The clamped signal at IC1 pin (2) on the video circuit board is rectified, received by IC208 pin (6) compared and amplified. Braking is done by feeding back the voltage induced in the brake coil. Q210 is used to close the iris; it operates so that iris opens after the beam current starts flowing in the camera tube. The AGC control voltage is derived from IC208 pin (8).

The auto iris is drawn to the iris "CLOSED" side by the spring when the camera power is set to OFF so that the valuable camera tube is protected from sunlight during transportation, etc.

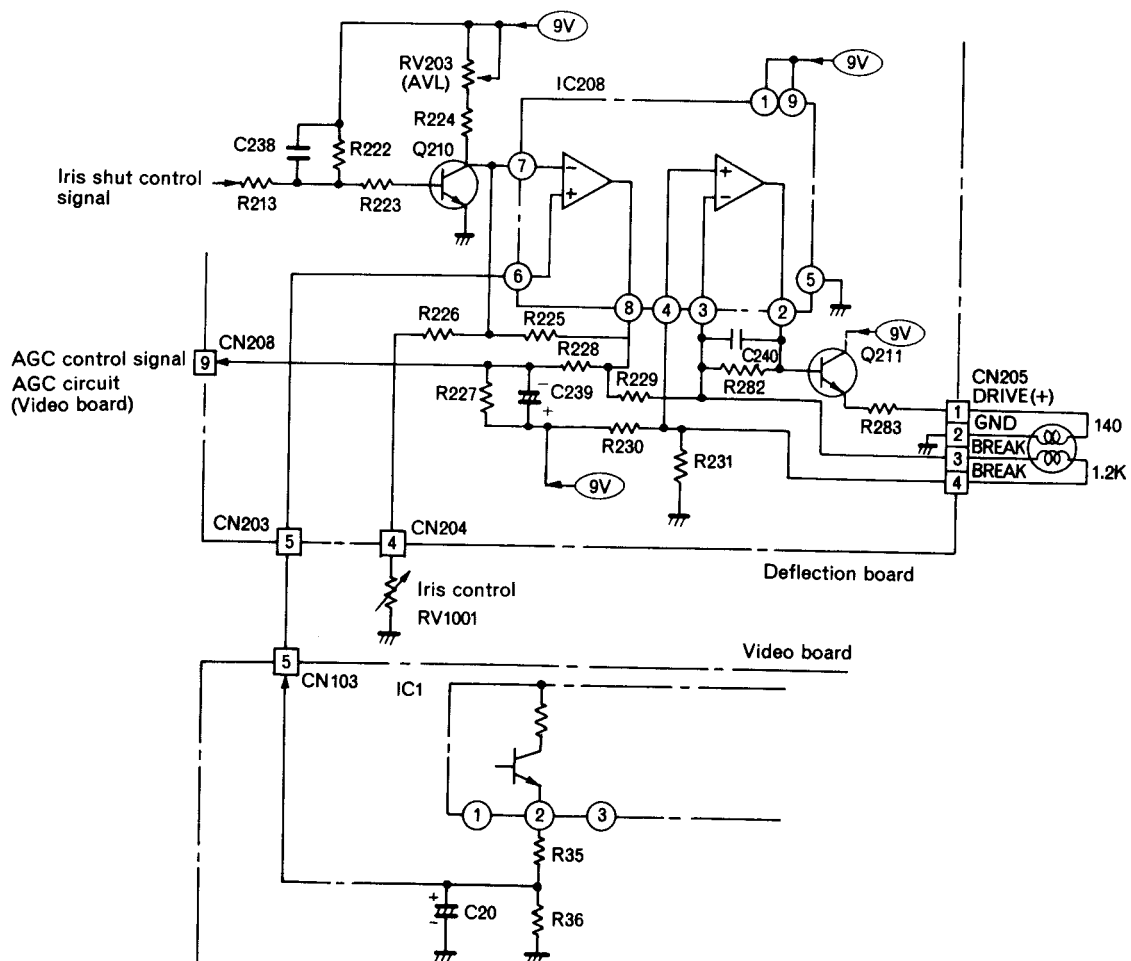


Fig. 1-1 Auto iris circuit

1-2 Power zoom operation

The power zoom driving motor is built into the zoom lens. TELE and WIDE operations are controlled by the seesaw switch installed on the top of the lens. Fig. 1-2 is

a circuit diagram. The zoom operation time is approx. 9 sec.

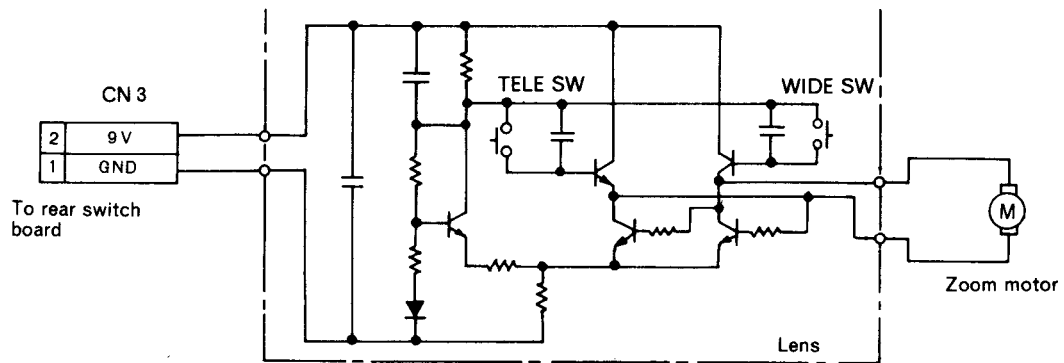


Fig. 1-2 Power zoom circuit

1-3 Macro mechanism

The zoom lens can vary the focusing distance from WIDE (8.5 mm) to TELEPHOTO (68 mm).

As is shown in Fig. 1-3, the zoom lens has a click position at the index point of 8.5 mm on the WIDE side, but the MACRO button can be pressed and the may can be turned further to enter the MACRO region.

In the MACRO region, MACRO and not normal zoom operation is done.

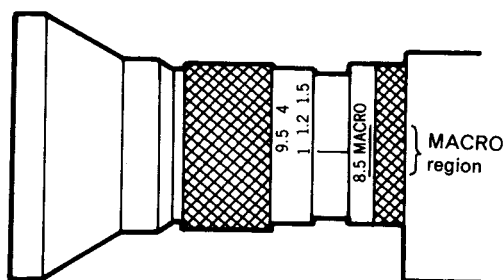


Fig. 1-3 MACRO index of zoom lens

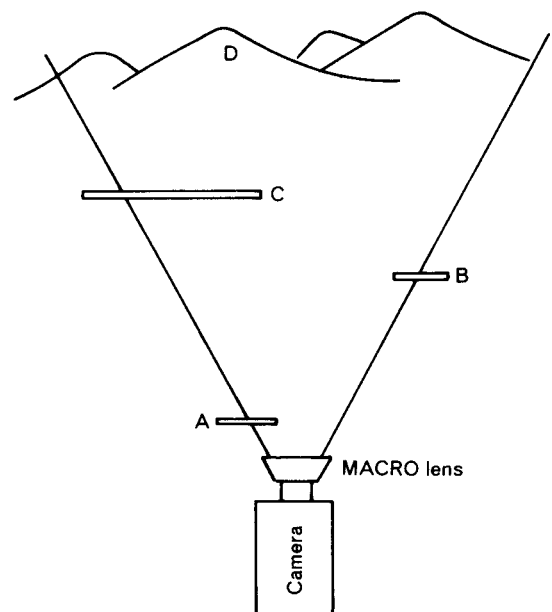


Fig. 1-4 MACRO focus diagram

MACRO region

Focus operations in MACRO operation are described in Fig. 1-4.

Assuming that the object A is in focus, B, C and D are out of focus naturally; as the zoom lever is turned gradually, the picture angle is not changed but focus moves to B, C and D in sequence. In MACRO, pickup moves focus within the specified picture angle of 8.5 mm on the WIDE side; this not only allows MACRO pickup but also allows unique special effects.

Chapter 2 Camera operations

2-1 Color temperature adjustment

Color temperature adjustment is done to correct the difference of the object conditions from the basic conditions (to match the R and B channel gain to G so that white balance can be obtained precisely for an incandescent bulb at 3100°K) of the color temperature of camera. White balance adjustment methods are divided into a) methods using an optical color conversion filter and b) methods varying the R and B channel gain. VK-C830 adjusts white balance using a combination of the optical and electrical methods.

Fig. 2-1 A), B) show the spectral distribution to the color temperature of the object and the spectral energy distribution of various natural light sources. Energy distribution in nature always varies depending on the color temperature of the object, weather, season and time, etc. It is the most important function of a camera to pick up completely matching the color temperature of the object.

2-2 Various indicator functions

VK-C830 is provided with various indicators; these are all concentrated inside the electronic viewfinder, and various data can be obtained simultaneously by monitoring using the viewfinder. All the indicators use LEDS and discriminate between indications and warnings with green and red. These indicators not only perform the indication and alarm operations shown in Fig. 2-2, but also perform operations shown in Table 2-1 with which the operation sequence of the camera or VTR is programmed.

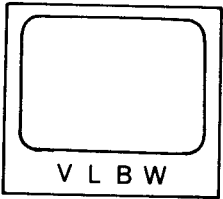
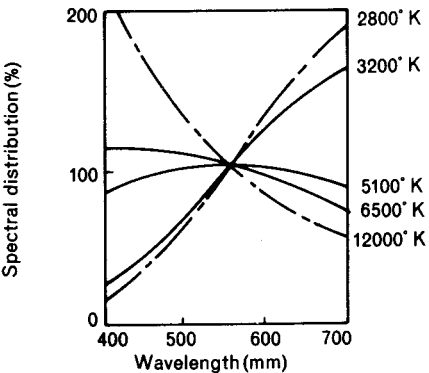
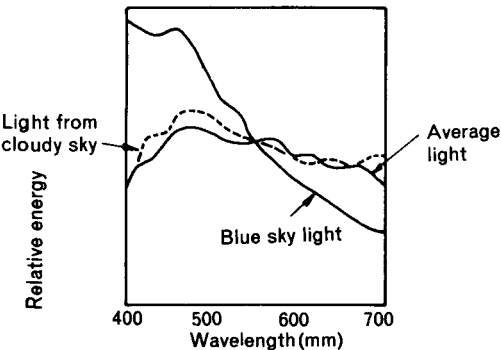


Fig. 2-2 Locations of indicators



A) Spectral distribution at various color temperatures



B) Spectral energy distribution of various natural light sources

Fig. 2-1

	V: VTR start (green)	L: Underexposure (red)	B: Battery warning (red)	W: White balance (red/green) Power save (red & green)
Power save switch set to "NORM"	(1) Interlocking operation with remote control switch (2) Lights during VTR REC (3) Goes off in VTR pause mode (4) Goes off at VTR tape end Note: Lights when camera connector pin 6 is set to Lo.	(1) Lights for underexposure and the video level is set to less than the specified value (2) Goes off in other modes than (1) above Note: Lights when the iris control and the color temperature correction filter are operated and the video level is set to less than the specified value.	(1) Lights when DC 1.2~1.8V is superimposed and supplied to the audio input line (goes off when it is 0.6 V or less) (2) Goes off in other modes than (1)	(1) "W" lights red or green when the white balance control knob is pressed (2) Goes off when white balance adjustment is completed
Power save switch set to "PWR SAVER"	(1) Set to pause mode in any state. (Not concerned with the ON/OFF operation of the trigger switch: Correct power is supplied to this circuit)	No operation (goes off)	No operation (goes off)	(1) "W" lights red and green

Chapter 3 Circuit description

3-1 Video signal processing system

The video signal processing system as far as the luminance signal (Y) and 2 color-difference signals (R-Y), (B-Y) are produced is described in the following. In Fig. 3-1, the signal obtained from the SATICON U9381AM target via amplification of the signal is fed to the preamplifier first. This level is 0.15 μ A (Y signal) and 0.08 A (chroma signal) in the standard pickup condition.

3-1-1 Preamplifier circuit

The signal output of approx. 0.15 Vp-p is obtained with a input impedance of approx. 3 k Ω and a voltage gain of approx. 50 dB.

The S/N of the camera is basically determined by noise generated in the initial stage of this preamplifier. The output impedance of the camera tube is very large in general and the high frequency output is decreased because the output capacitance of the tube itself.

So, S/N deterioration of the chroma signal around the modulation frequency 3.58 MHz determined by the pitch of the stripe filter becomes more conspicuous than that of the luminance signal.

The Percival circuit method, that is the method to insert a coil in series with the input circuit, is used to improve this S/N deterioration. This is to divide the output capacitance of the camera tube and the input capacitance of the pre-amplifier by this coil, and to generate resonance with a frequency around 3.58 MHz.

As is shown in Fig. 3-2, by employment of the Percival coil, the S/N of the fc (chroma signal modulation frequency) is improved by approx. 5 dB.

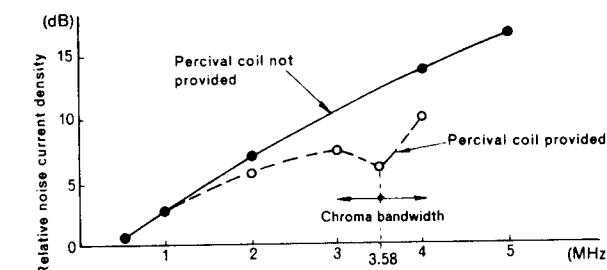


Fig. 3-2 Improvement of S/N by Percival coil

Table 2-1 Explanatory table of various indicator operations in camera

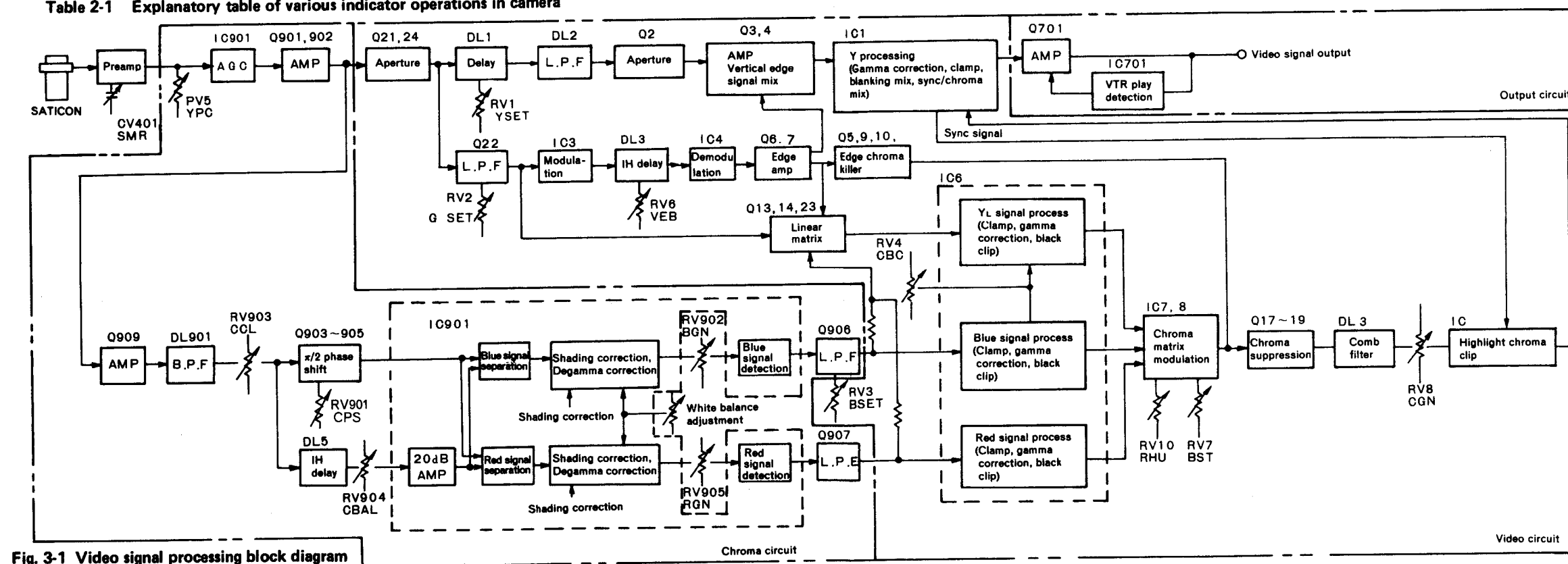


Fig. 3-1 Video signal processing block diagram

3-1-2 Processing circuit

(1) AGC circuit

The signal from the preamplifier is fed to the AGC circuit on the chroma circuit board in the video board. The AGC circuit is composed of IC901 HA11748MP (between pins 18 - 17) and Q901, Q902, Q908. The signal (approx. 0.15 Vp-p) output from the preampli-

fier is amplified by approx. 14.8 dB via this AGC circuit and fed to the chroma circuit and Y process circuit. AGC control is done by controlling the DC potential at pin (16) on the chroma circuit board. The gain during AGC is set to a maximum of approx. 6 dB (Total: 20 dB).

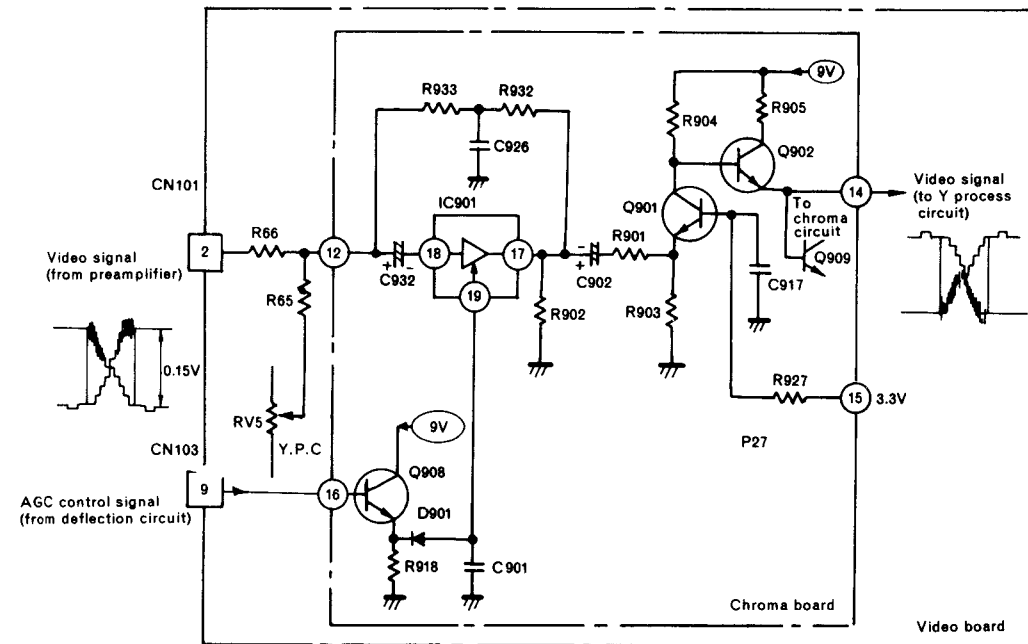


Fig. 3-3 AGC circuit

(2) Aperture circuit

The aperture circuit corrects deterioration of modulation in the high frequency of the camera tube, and emphasizes the edge section for clarity.

Fig. 3-4 shows the AGC circuit. One feature of this circuit is that this is composed of 2 circuit steps using LC resonance. Assuming L6, C10, Q21 as Aperture 1 and L1, C2, Q2 as Aperture 2, Aperture 1 outputs high pre-shoot because over-shoot is likely to be output by other circuits, and adjusts the symmetry of pre-shoot and over-shoot.

Aperture 2 outputs the same amount of pre-shoot and over-shoot to increase integrated frequency response by 6 dB per 2 MHz. The delay time of 900 msec is provided to match with the aperture to separate the luminance signal via DL1, DL2 and to match the phase (YC timing) with the output of the chroma signal.

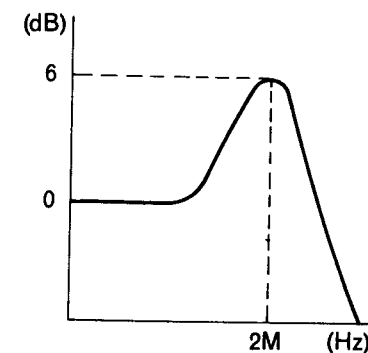


Fig. 3-4 Frequency response

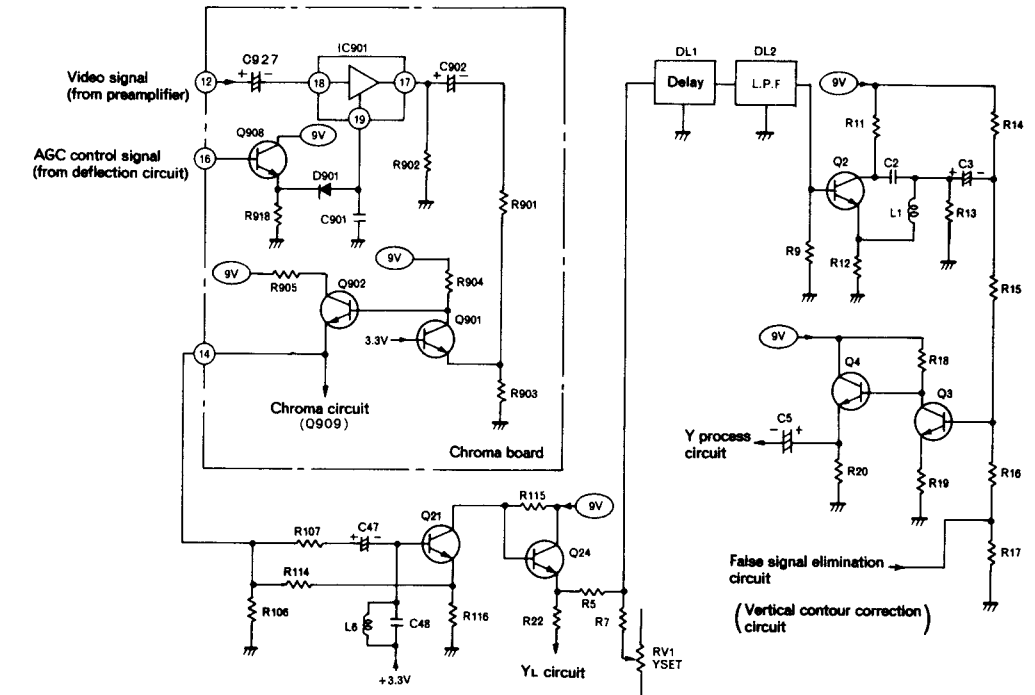


Fig. 3-5 Aperture circuit

3-1-3 Y processing circuit

The luminance signal is fed to the processing circuit in IC1 and given the following signal processing.

- Clamp
- Gamma (γ) correction
- Blanking mix

- Sync signal, chroma signal mix
- Iris control signal output
- Highlight chroma clip signal output
- Black clip

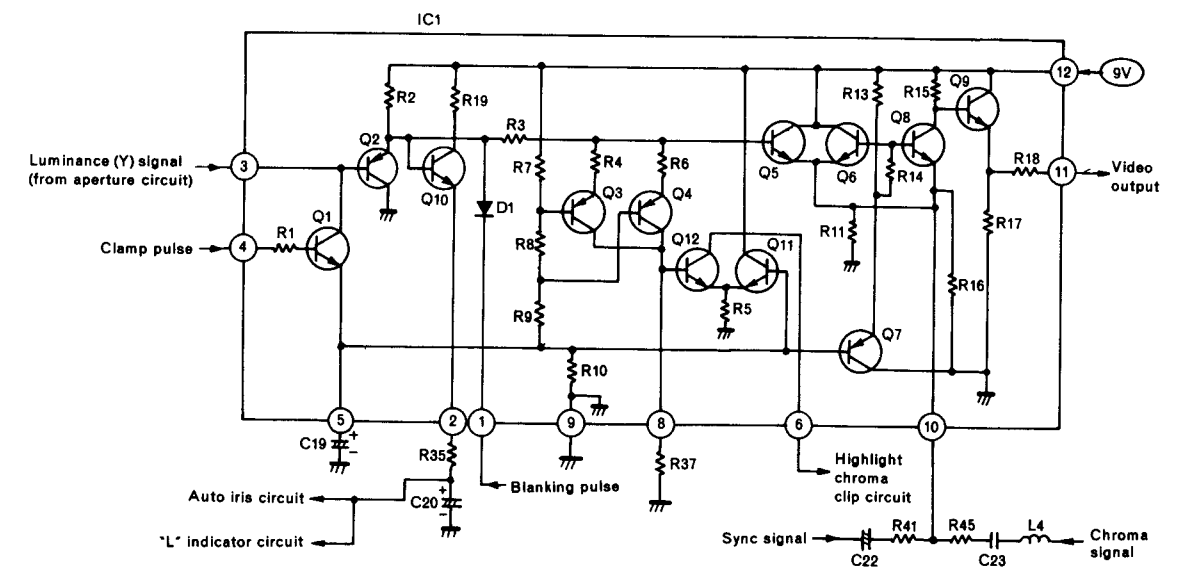
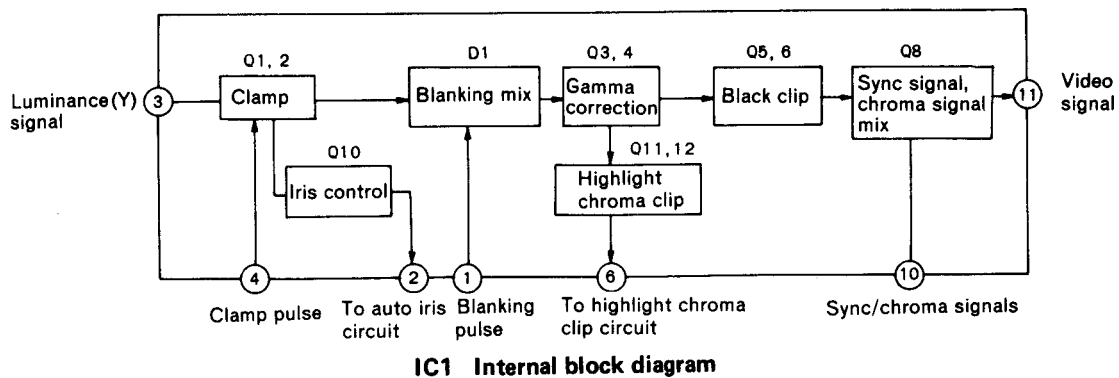


Fig. 3-6 Processing circuit diagram



(1) Clamp circuit

It is required to fix the black level which is the reference of the signal as direct current when performing gamma correction or linear clip signal processing. The luminance signal mixed with the horizontal drive pulse (HD) via the Y aperture circuit is fed to IC1. The horizontal drive pulse of this luminance signal is fixed to the DC potential divided by R7 ~ R10 via the transistor Q1 driven by the clamp pulse (CP). The DC level of the luminance level can be set by the level of the horizontal drive pulse mixed via the Y aperture circuit.

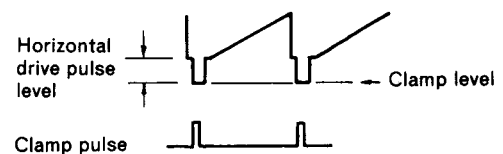


Fig. 3-7 Clamp circuit operation diagram

(2) Gamma (γ) correction circuit

The correction circuit is set to $\gamma = 0.5$ because a SATICON with $\gamma = 1$ is used. The luminance signal output shown in Fig. 3-6 is given non-linear amplification similar to the point of deflection with $\gamma = 0.5$ by the DC voltage set by R7 ~ R13 and R3, R4 and R3, R6.

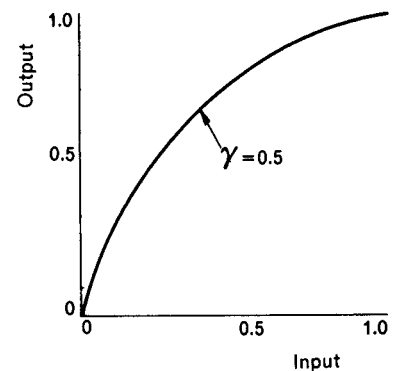


Fig. 3-8 Gamma correction curve

(3) Linear clip circuit

High level sync noise is mixed in the preamplifier output signal during the blanking period due to the input of the deflection pulse, etc. The rated value of the video signal level is specified and when the level exceeds that value, picture quality deteriorates and the VTR does not operate normally. So, the clip circuit is provided to control the output level of the camera so that it is always within the rated value, to eliminate sync noise during the blanking period.

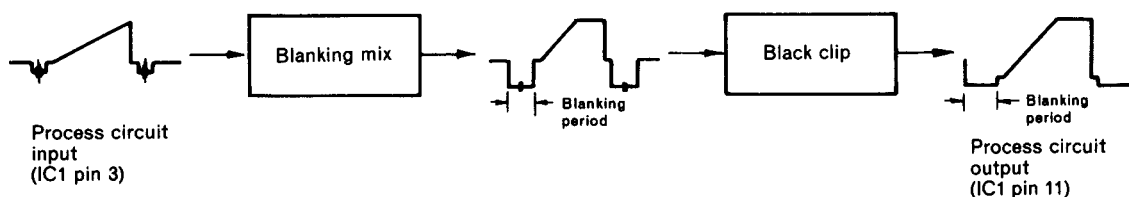


Fig. 3-9 Blanking linear clip circuit operation

(4) Sync signal/chroma signal mixing circuit

This circuit mixes the color-difference signal (chroma signal) produced by modulating the sub-carrier, and the sync signal (SYNC) with the luminance signal (Y) to finally produce the NTSC signal.

3-1-4 Y_L signal processing circuit

The Y_L signal processing circuit produces the Y_L signal from the space-modulated signal output from the pre-

amplifier.

The signal output from the pre-aperture circuit, with its carrier removed by the LPF (bandwidth: approx. 500 kHz) of Q22, becomes the Y_L signal.

However, the R/B signals are contained in this signal ($Y_L = G + R/2 + B/2$), so the Y_L (G) signal is produced via the linear matrix circuit.

The vertical edge signal is mixed via the emitter of Q13 to improve the false signal generated by vertical correlation, making it inconspicuous.

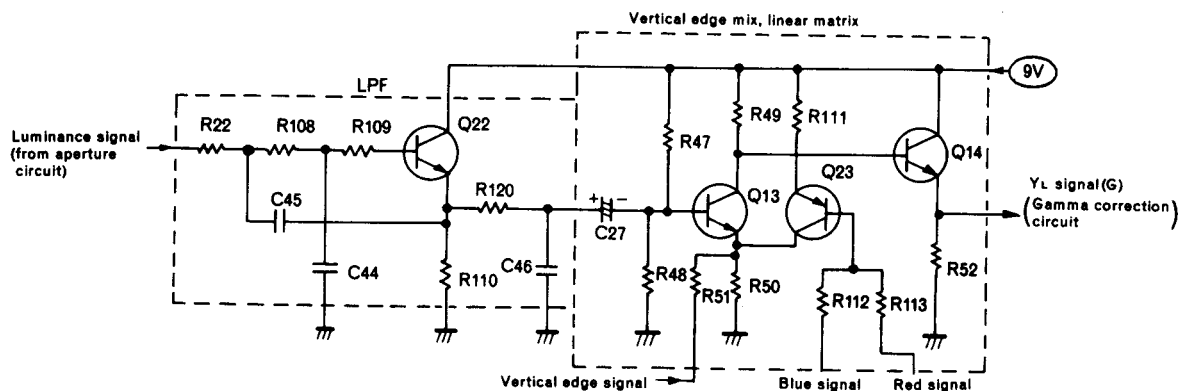


Fig. 3-10 Y_L signal processing circuit

3-1-5 Chroma separation circuit

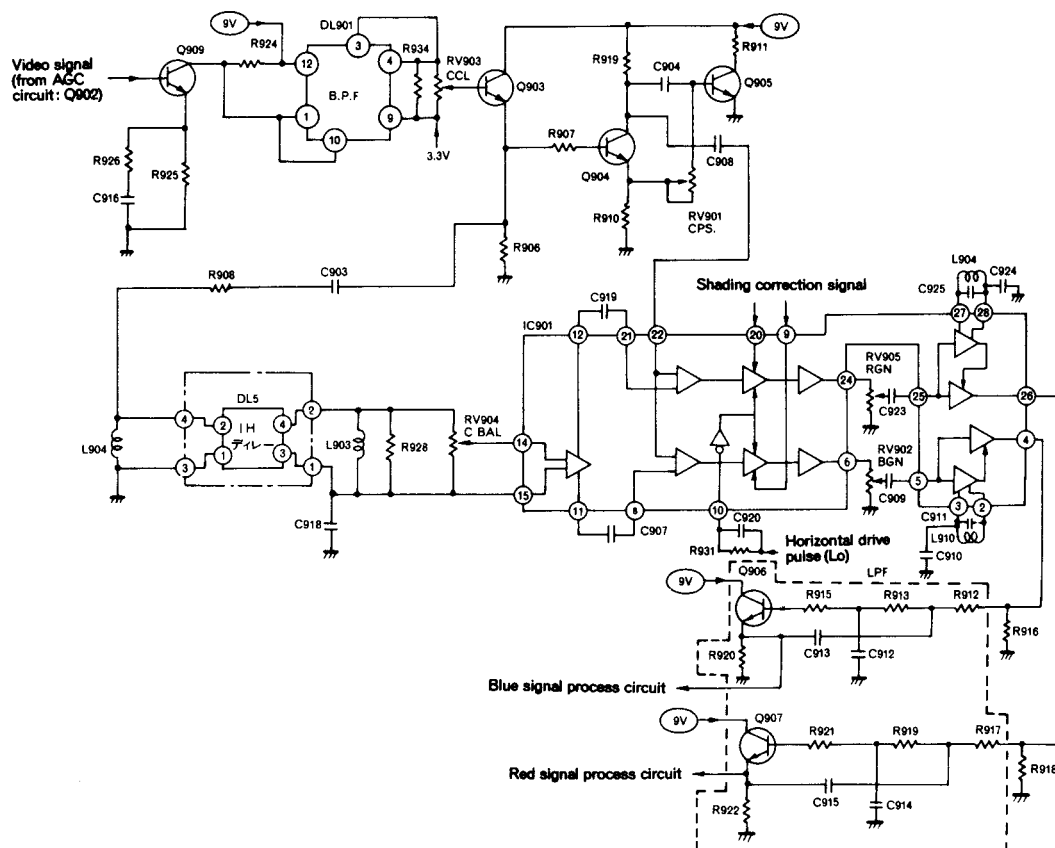


Fig. 3-11 Chroma separation circuit

This is the circuit to derive the chroma signal and forms an independent circuit board called the chroma board. The chroma data signal is the 3.58 MHz modulation chroma signal. So, this signal can be separated via the BPF (DL901). The modulation chroma signal component of the signal gain-controlled by the AGC circuit is separated by the BPF (DL901) and then fed to the 1H delay circuit of DL5 and the $\pi/2$ phase shifter. The 1H delayed signal is attenuated by approx. 15 dB via DL5, so it is amplified by approx. 20 dB and added/subtracted to/from the $\pi/2$ delayed signal; the R and B signals are produced by this. (Refer to "Principle of single carrier frequency separation system").

The signals separated to R and B signals are further applied with degamma correction, modulation shading correction and color temperature correction. This corrected signal is gain-controlled (for white balance adjustment) by RV902, RV905 and then it is detected. The circuit operation shown above is done by IC901 HA11748MP.

The detected signal is band-limited by the LPF composed of Q906, Q907 and phase-matched with the Y_1 signal.

The R/B separation adjustment in the above operation is done by RV901 (CPS) and RV904 (C. BAL). The adjustment is done using TP901 on the chroma circuit board after shooting the color bar chart so that the yellow level is minimum.

3-1-6 SAW, PARA shading correction signal generation circuit

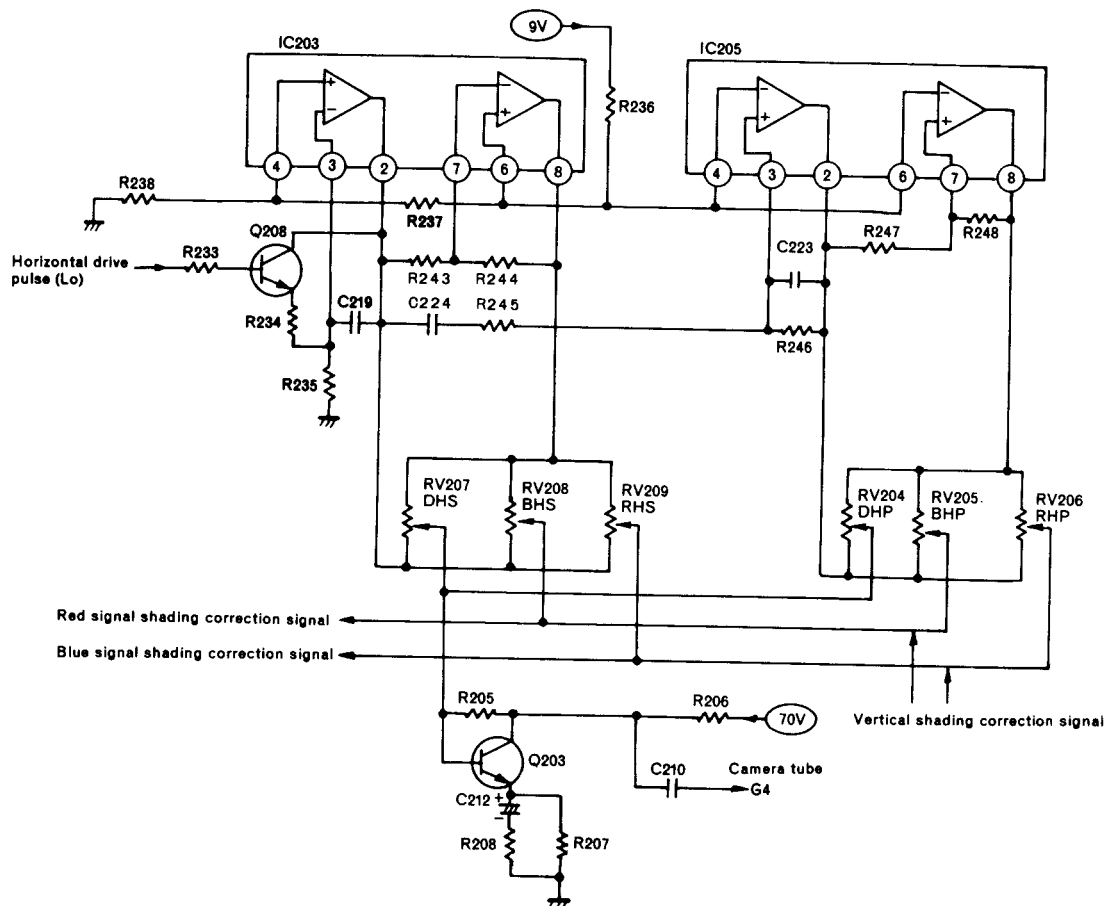


Fig. 3-12 SAW/PARA shading generator circuit

Color shading caused by uneven modulation characteristics of the camera tube coil assembly, etc., is likely to occur in a frequency separation type camera. The dynamic focus shading correction waveform is applied to the focus electrode of the camera tube, and the circuit signal correction shading correction waveform is produced to control the level of the R/B chroma signal, to correct this chroma shading electronically.

Fig. 3-12 shows only the circuit for horizontal pulse generation in the SAW (sawtooth wave) and PARA (Parabolic wave) generators.

The generator circuit for the vertical pulse has almost the same circuit composition (IC202, IC204) as the circuit for the horizontal pulse; the vertical SAW/PARA waveforms are produced, and it is mixed with the horizontal signal and applied to the chroma separation circuit IC901 R/B shown in Fig. 3-11.

3-1-7 Degamma correction circuit

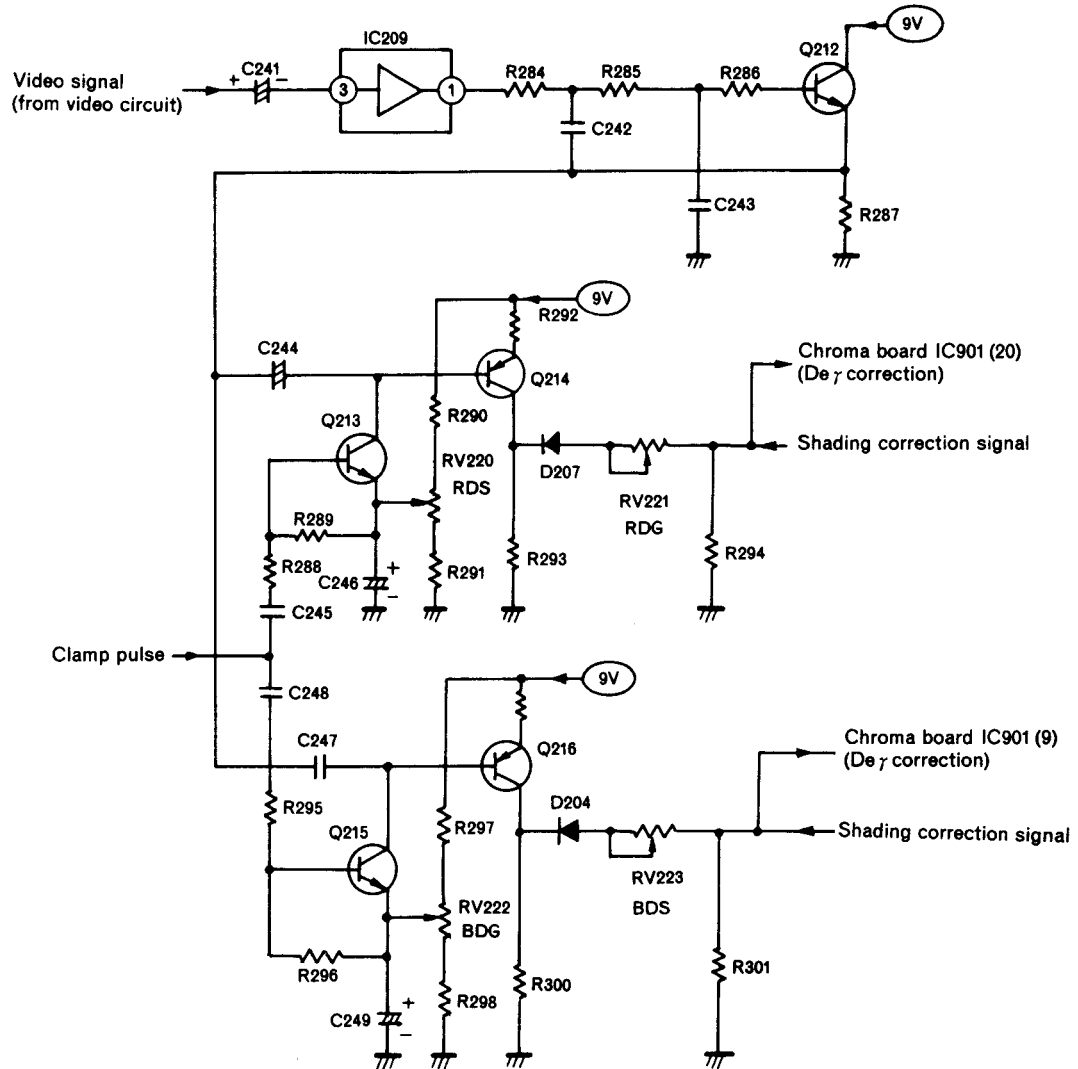


Fig. 3-13 De γ circuit

The Dey circuit corrects non-linear distortion in highlights from the camera tube. As is shown in Fig. 3-14, the chroma carrier is provided with the γ characteristics with respect to the Y_L signal so this circuit is to correct it. In Fig. 3-13, the video signal output from the preamplifier is amplified by IC209 becoming the Y_L signal via the LPF Q212.

The correction signal is produced by clamping this Y_L signal using Q213 inverting/amplifying it by Q214 to control the active level of D207. This correction signal is mixed with the shading correction signal; it is fed to IC901

(HA11748) on the chroma board where it is corrected independently for R and B. The adjustment is to shoot the grey scale and optimize the balance of the topmost step.

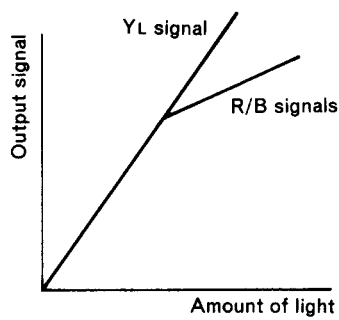


Fig. 3-14

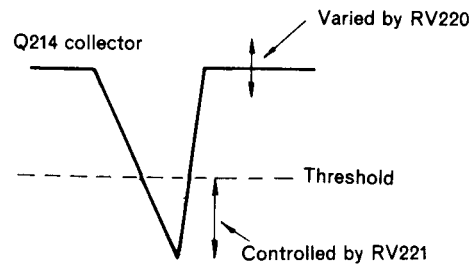


Fig. 3-15

3-1-8 Chroma process, matrix, modulation circuit

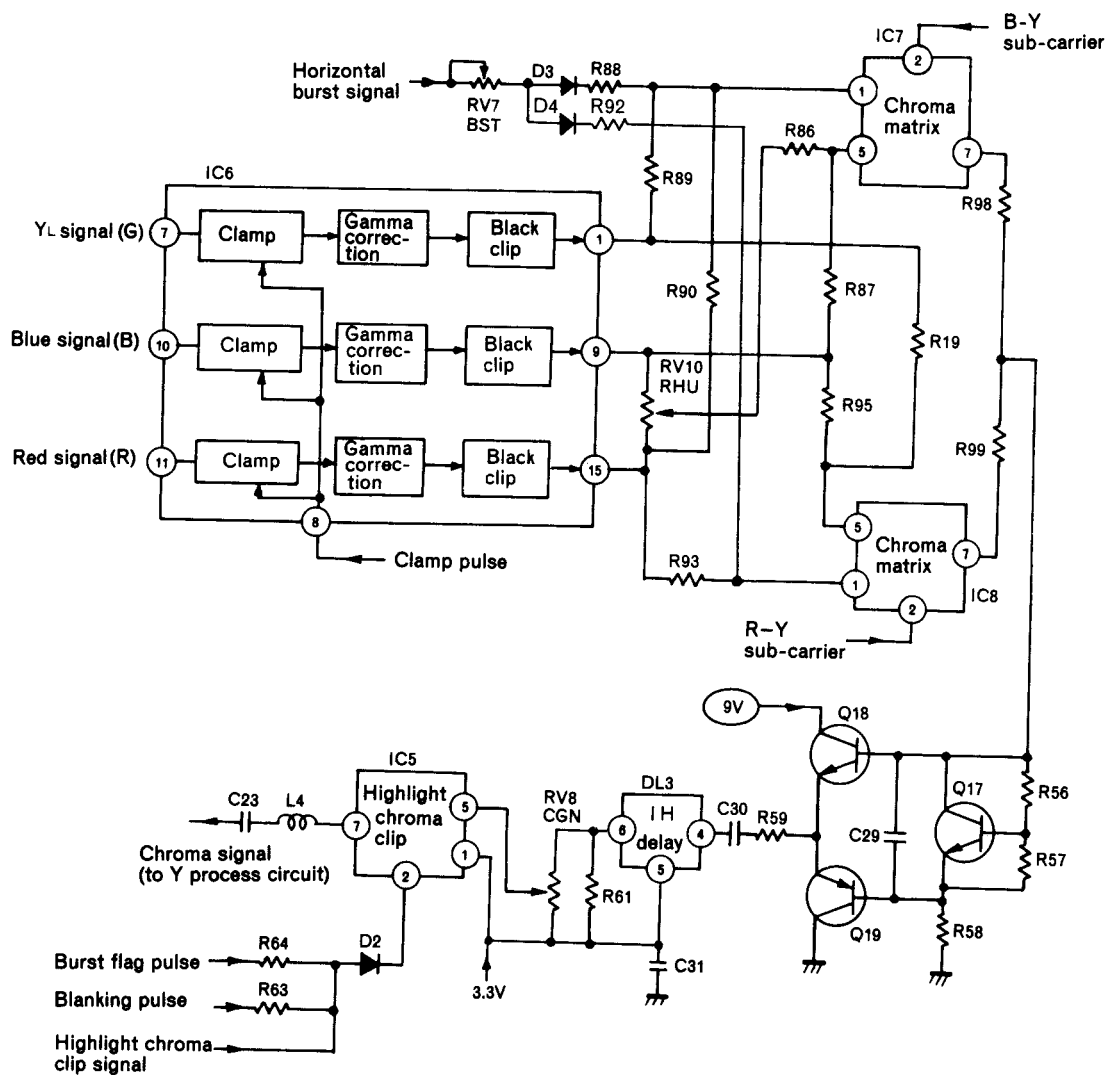


Fig. 3-16 Chroma process, matrix, modulation circuit

(1) Chroma process circuit

The chroma process circuit clamps the G, B, R signals by IC6 and performs the γ correction and black clip signal processing. The operation is almost the same as that described in 3-1-3. The only difference is that the blanking mix circuit is not provided and the signal band differs.

(2) Matrix circuit, modulation circuit

The G, B, R signals from the chroma process output are composed by resistors RV10, R86, R87, R89, R90, R91, R93, R95 and the differential inputs of IC7 pins 1 & 5, IC8 pins 1 & 5, and the B-Y and R-Y color-difference signals are obtained.

The burst signal which is the standard of the color phase is also applied to IC7 pin 1 and IC8 pin 1. The B-Y, R-Y, color-difference signals modulate the sub-carrier applied to IC7 pin 2, IC8 pin 2, becoming the B-Y and R-Y modulated chroma signals.

Further, 2 modulation signals are composed by R98 and R99 becoming the chroma signal.

(3) Chroma suppression

This circuit is composed of Q17, 18, 19 and it suppresses the chroma signal with a low level as shown in Fig. 3-17. This improves the color shading inherent in the frequency separation system.

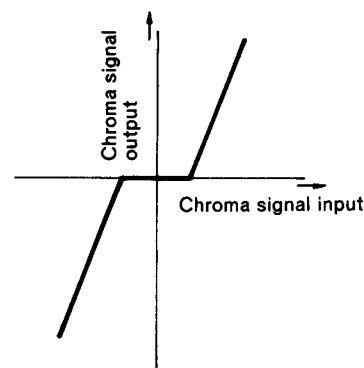


Fig. 3-17

(4) Chroma amp, highlight chroma clip

The modulated chroma signal enters IC5 pin 5 via RV8 and it is amplified.

The frequency separation system has the defect that low beam is likely to occur in highlight sections such as fluorescent lamps, etc., causing coloring of highlight sections. This phenomenon greatly degrades picture quality, so when the luminance signal is above the specified level, it is detected by Q12 in the Y process circuit IC1 described in Item 3-1-3, to lower the potential of the chroma amp IC5 pin 2 to shut off the chroma signal so that the highlight section is not colored.

3-2 False signal eliminator circuit

As described previously, generation of the false signal cannot be avoided in the frequency separation system. This is because vertical correlation is used.

Various circuits can be used to remove or reduce this false signal. VK-C830 also uses an eliminator circuit, so the principle of the false signal generation and the elimination method are described in the following.

Fig. 3-19A shows an example of color error generated at the vertical edge; the center of the vertical direction in the diagram is white and the black band object is assumed to be shot at its top and bottom. Considering the adjacent scanning lines a, b, c, d, e scanned continuously, the chroma component of the signal can be shown by the formula using a, b, c, d, e.

That is, the false signal is generated at the edge where the

object is changed over from black to white, or white to black.

This condition can be explained using diagram A with formula a ~ e. That is, when scanning b, ER and EB are obtained by adding or subtracting a and b with 1H delay.

When Ea to be added is zero, ER and EB are output correctly by addition and subtraction, so no false signal appears at the edge.

Next, Ed is present but Ee is set to zero in the first scanning of e after white is changed to black. As a result, ER and EB are output correctly.

That is, ER and EB are present at the black edge, so a magenta false signal appears.

Next, considering the case when the scanning line position differs a little.

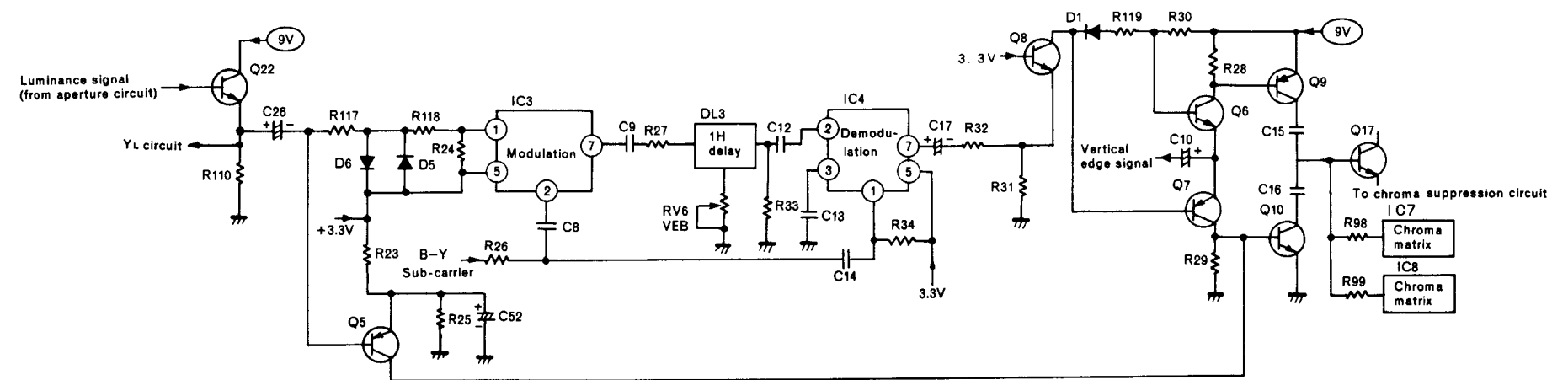


Fig. 3-18 False signal eliminator circuit

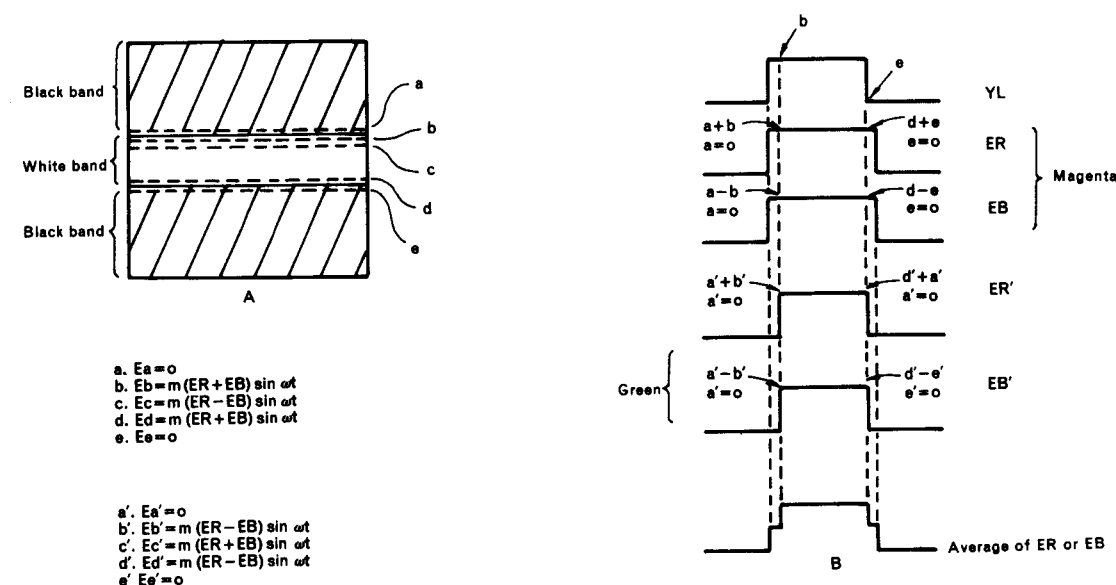


Fig. 3-19 Vertical false signal generation

The chroma outputs for the scanning lines a ~ e are $E_a \sim E_e'$ at that time.

At the rise to white from black, E_b is almost zero and the chroma signal is not present.

That means only Y is present, so the white edge is colored green.

When such an actual object is shot, this coloring phenomenon varies, sometimes appearing and sometimes disappearing, at the edge depending on the condition of the object in relation with the phase of the scanning line.

Taking the average of these values, it can be indicated by the waveform at the bottom in Fig. B, and the difference with the Y_L signal can be seen as magenta and green false signals.

In the false signal reduction method, the signal Y_L , 1H delayed from the Y_L signal is produced as shown in Fig. 3-20, the difference signal with Y_L ($Y_L - Y_L'$) is produced and this signal is mixed with the Y_L . This reduces the false signal.

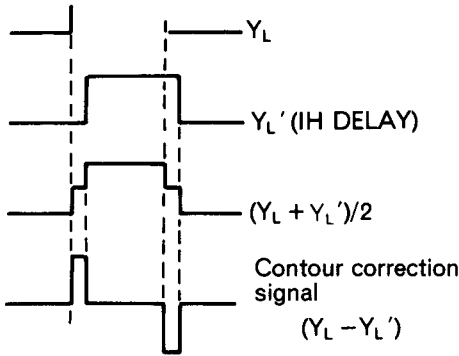


Fig. 3-20 Reduction of false signal and use of vertical contour signal

VK-C830 uses this method, and together with this edge the method to reduce the false signal at the edge by switching operation is used. The Y signal output from Q22 with its sub-carrier modulated via the modulator in IC3 is sync-detected by IC4 via the comb filter DL3 becoming the signal as shown in Fig. 3-21 at the collector of Q8. The base line noise of this signal is suppressed and only the edge signal is derived at the emitter of Q6 (or emitter of Q7). RV6 is the balance adjusting resistor. Then, this is mixed in the luminance signal (Y) circuit as the vertical edge signal. At the same time, as the false signal is generated due to the difference from Y as described previously, this edge signal is averaged by mixing it with the Y_L signal (mixed by emitter of Q13) to reduce the false signal. By switching the chroma signal using this signal, coloring of this section is cancelled and the false signal is reduced. (Refer to Fig. 3-21) Q5 is the highlight chroma killer transistor.

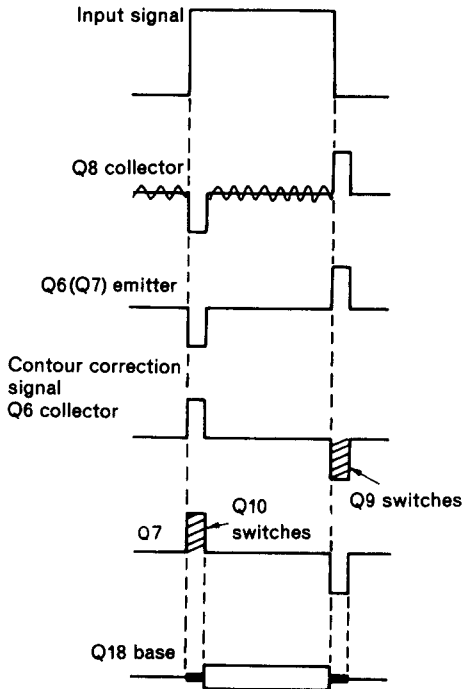


Fig. 3-21 False signal

3-3 Sync circuit

The sync generator circuit is composed of 44-pin C MOS IC HD-440072F. This IC is operated at +7V. This LSI has been designed so that it can correspond to different TV stan-

dard systems (NTSC, PAL or SECAM) by only small changes to wiring and elements. Table 3-1 is its function table.

Pin No.	Name	Function	Remarks
43	282fH	Sub/master oscillator	Input
1	282fH OSC	Sub/master oscillator	Output
2	FILTER	LPF	Output
5	FILTER	LPF	Input
6	VD	Vertical drive pulse	For camera VD
7	CAMERA. HD	Camera horizontal drive pulse	
10	C. BLK	Composite blanking pulse	Encoder
11	BF	Burst flag pulse	Encoder
13	BEAM. BLK	Beam blanking pulse	
16	VDD	Power supply	
18	H. BF	Horizontal burst flag pulse	Matrix
19	SELECT Input	HIGH	
23	CP-2	Clamp pulse No. 2	Process
27	C. SYNC	Composite sync signal	
31	4fSC OSC	Master oscillator	Input
33	4fSC OSC	Master oscillator	Output
35	SC (90°)	Sub-carrier	R-Y
36	SC (180°)	Sub-carrier	Y-B
39	GND	GND	

Table 3-1 HD-440072F function table

Fig. 3-23 shows the pin arrangement as seen from above and the block diagram and Fig. 3-22, the peripheral circuits. The circuit is provided with 2 reference oscillators, A and B. A is a crystal oscillator using the C MOS inverter and oscillates at 17.7347MHz, 4 times the frequency of the sub-carrier. This is divided by 4 to produce the sub-carrier. It is further divided by 162 and phase-compared with the output signal produced by dividing the output of the voltage control oscillator (VCO) B by 161. This comparator output is converted to DC via the low-pass filter C to control VCO B. This is the PLL (Phase Locked Loop) circuit, and the oscillation frequency of VCO B is locked at 282 times the horizontal frequency. This is divided by 2 and is applied to the pulse forming circuit as the clock pulse to obtain the required pulses

such as the horizontal drive pulse (HD), vertical drive pulse (VD) and SYNC pulse, etc. Q12 and Q16 in the video circuit are the polarity inverter and buffer to supply the required pulse to each section of the camera. Q11 is the power supply and filter to supply +7V to the IC.

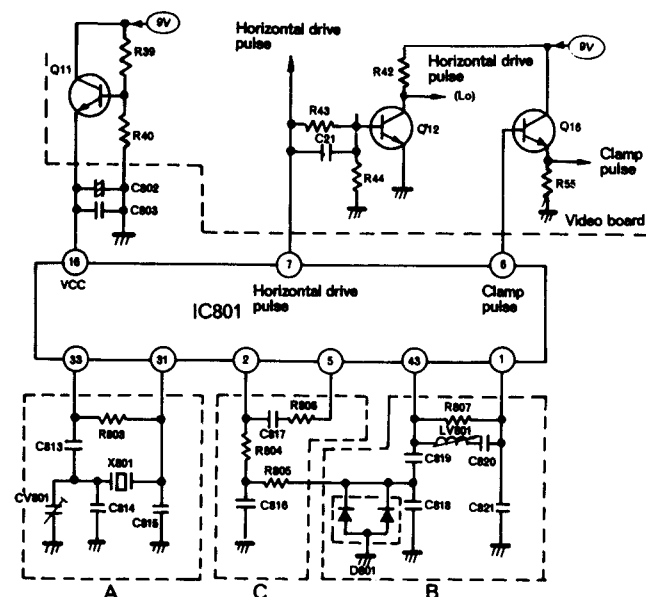
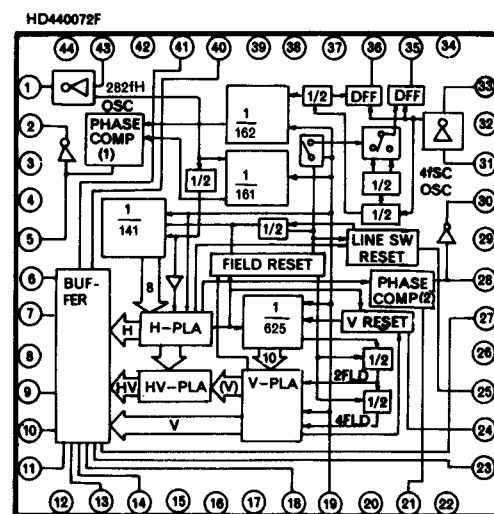
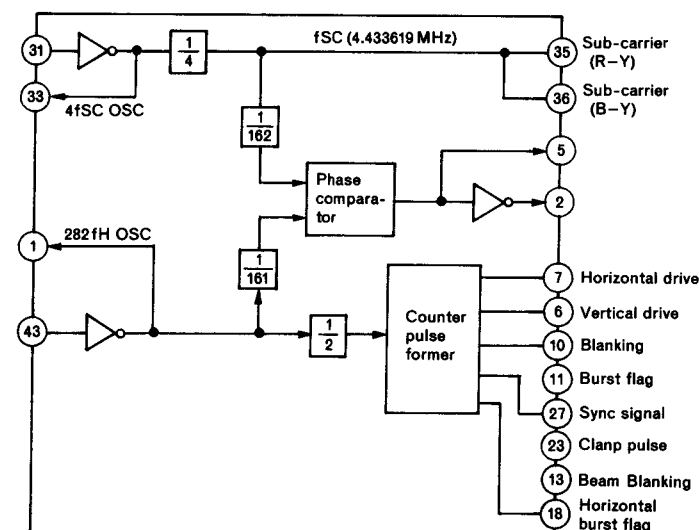


Fig. 3-22 HD-440072F peripheral circuits



HD-440072F Block diagram



HD-440072F Simplified block diagram

Fig. 3-23

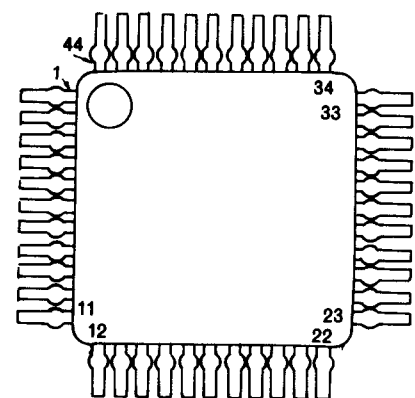
3-4 Deflection/high voltage circuits

3-4-1 Horizontal deflection circuit

This circuit can be divided into the deflection system and the linearity correction system. The deflection system is the ordinary switching system. The deflection size is set by adjusting LV201. Linearity is corrected by applying the inverse polarity sawtooth current to the deflection coil. Horizontal centering is done by superimposing DC current the on deflection coil power-supply. +5V is the reference power supply for this.

3-4-2 Vertical deflection circuit

The vertical sawtooth wave produced by the vertical shading correction circuit is amplified via IC207 to output a constant current. RV218 (HGT) adjusts the vertical amplitude and RV219 (VCT), the deflection centering. The output current of IC207 pin 2 forms the negative feedback route to pin 3 via the vertical deflection coil, and the deflection coil is driven by constant current.



Pin arrangement viewed from the top

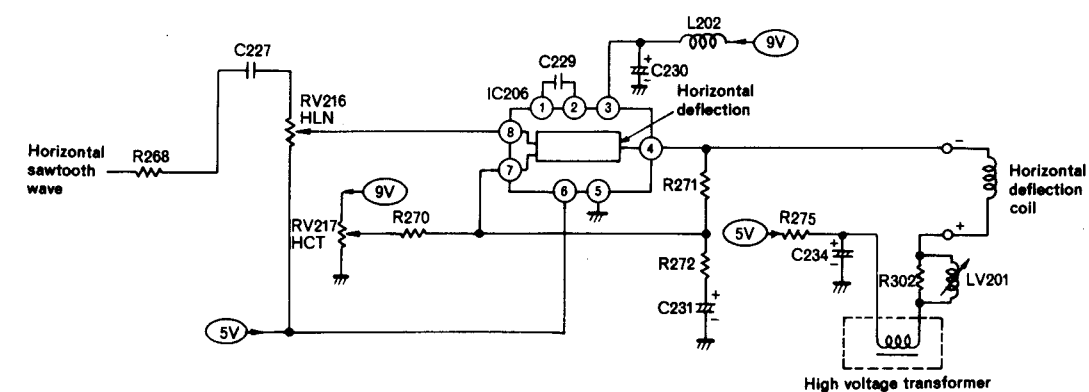


Fig. 3-24 Horizontal deflection circuit diagram

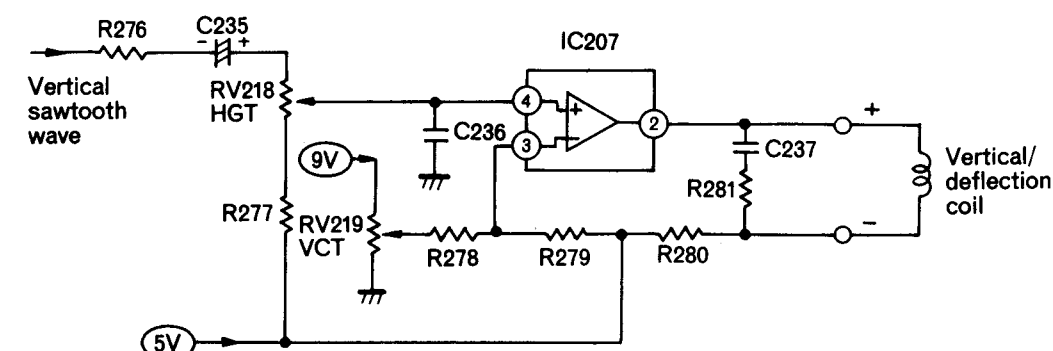
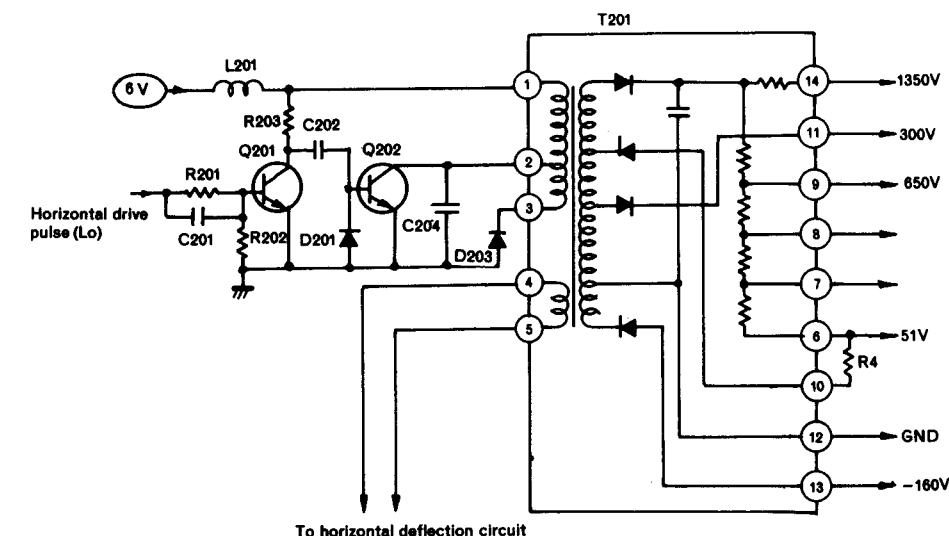


Fig. 3-25 Vertical deflection circuit diagram

3-4-3 High voltage generator circuit

The horizontal drive pulse is amplified by Q201, switched by Q202, and the specified high voltage is obtained by boosting and rectifying/resistance division.



3-5 VTR trigger circuit

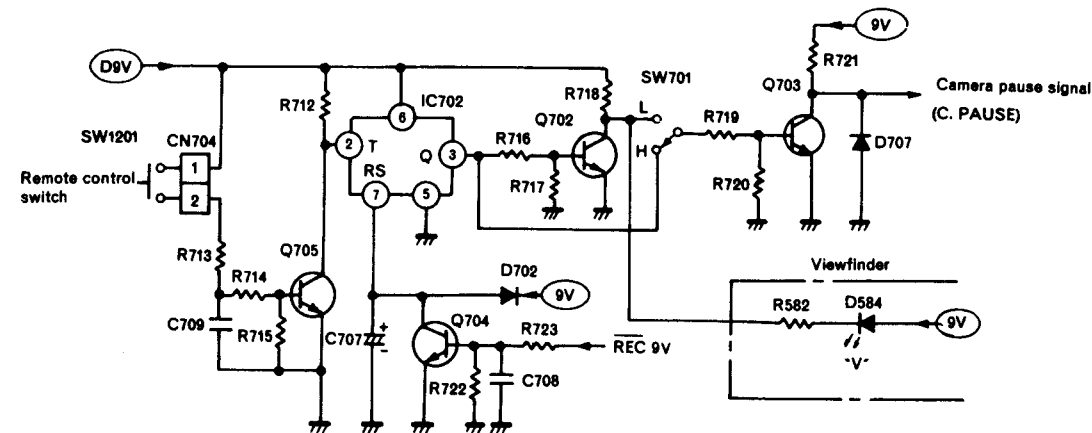


Fig. 3-27 VTR trigger circuit diagram

IC702 is the flip-flop (FF) and is reset when the pin 3 output is set to Lo (0V).

When the VTR is in other modes than the record mode, REC9V is applied to Q704, Q704 is set to ON, IC702 pin 7 is set to Lo and the FF operation is inhibited (INHIBIT) entering the reset mode.

When the VTR is set to the record mode, REC9V is set to 0V, Q704 is set to OFF and INHIBIT is released but the FF is left reset and the VTR is set to the record pause mode.

When the remote control switch (SW1201) is pressed,

Q705 is set to ON, IC702 pin 2 is set to Lo (0V), the FF is set, IC702 pin 3 is set to Hi (9V), Q703 to ON, the VTR REMOTE output to Lo (0V) and the VTR enters the record mode.

The FF inverts every time the remote control switch is pressed, and the VTR repeats the record and pause modes alternately.

IC702 pin 7 is set to 0V when the camera is set to the power save mode, the FF operation is inhibited and the VTR enters the record pause mode.

3-6 Indicator detection circuit

3-6-1 Battery detection circuit

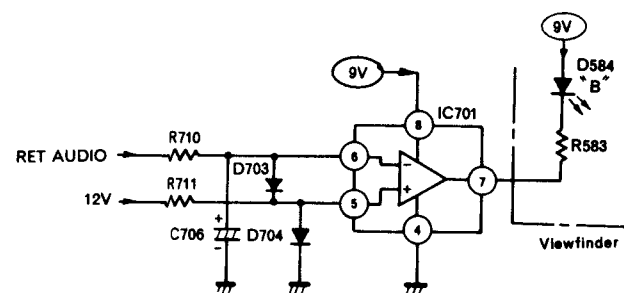


Fig. 3-28 Battery alarm detection circuit

When the voltage low alarm signal output from the VTR is received via the return audio circuit and IC701 pin 6 of the OUT board is set to Hi, the pin 7 output is set to Lo and the "B" indicator LED lights.

3-6-2 Video level detection circuit

The video output derived from the Y process IC1 pin 2 is set to the average DC level via R35 and C20, and it is compared with the reference voltage output from RV12 (LIS) by the comparator IC10 and detected; when it is set to less than the reference voltage, the comparator output is set to 0V and the "L" indicator LED lights.

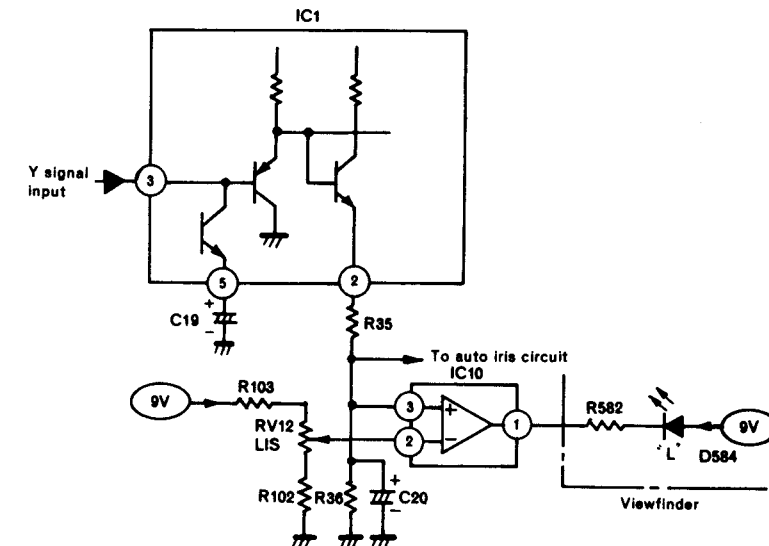


Fig. 3-29 Video level detection circuit

3-6-3 White balance indicator detection circuit

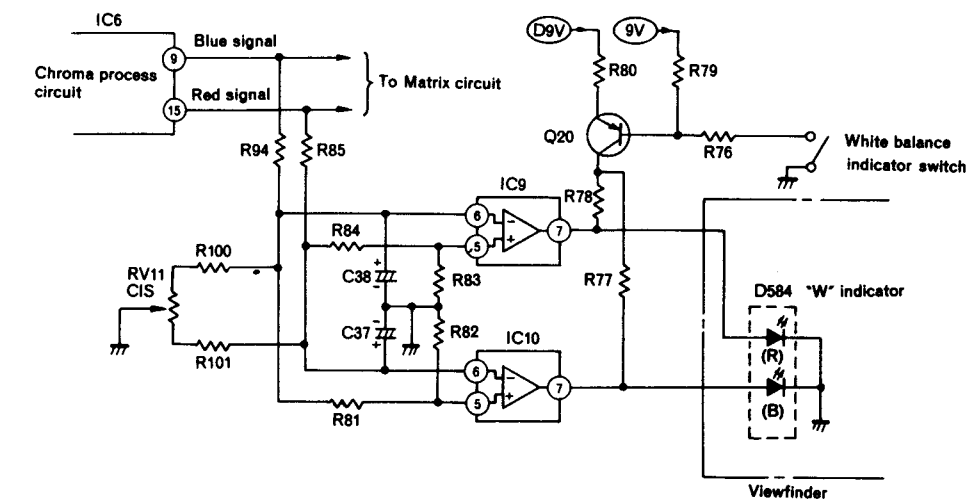


Fig. 3-10 White balance indicator circuit diagram

The B Ch and R Ch of the chroma process IC6 are converted to the average DC current respectively via R94, C38 and R85, C37, and the B Ch and R Ch levels are compared and detected via IC9 and IC10; when $B > R$, the IC9 output (pin 7) is set to 0V and the IC10 output (pin 7) is set open.

When the white balance VR SW is pressed in this state, Q20 is set to ON and the green (G) LED lights. When $B < R$, the red (R) LED lights. The width of the neutral point (where neither the green or red LED lights) is set by R84 and R83, R81 and R82. The power supplies of IC9 and IC10 are cut off during power save, both outputs are set open, Q20 is set to ON via R79 and the red and green LEDs light.

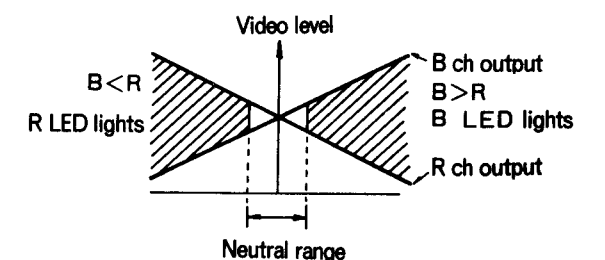


Fig. 3-31 LED lighting range diagram

3-6-4 VTR indicator

When the VTR is set the record mode, REC9V is set to 0V, Q704 to OFF, IC702 pin 3 to Lo and Q702 is set to OFF.

When the remote control switch (SW1201) is pressed, IC702 pin 3 is set to Hi, Q702 to ON and the collector of Q702 is set to Lo, and the "V" indicator LED lights.

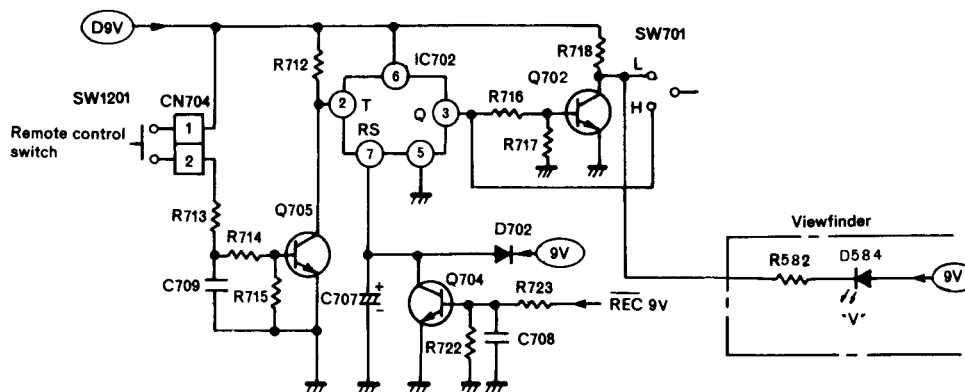


Fig. 3-32 V indicator circuit

3-7 Video select circuit

The operation when the VK-C830 is connected to VTRs (VT-6800, VT-6500, etc.) in which DC3V or more is superimposed over the video signal returned from the VTR and sent from the camera connector pin 1, is described as follows.

The video signal entering Q701 via R701 and C701 are sent to the electronic viewfinder (VF) and the camera connector pin 1 via R703.

The video signal with DC superimposed is returned from the VTR via the camera connector pin 1 during playback. The DC component superimposed over the return video signal is rectified by R706 and C703; it is detected and

applied to IC701 pin 2. This DC component is compared with the reference voltage output from pin 3 by IC701 and sets IC701 pin 1 to 0V. Then, Q701 is cut off, the video signal from the camera is shut off, and only the video signal from the VTR is sent to the viewfinder.

Note: When the camera is connected the type of VTR (VT-7000, etc.) in which DC is not superimposed over the video signal returned from the VTR, the picture from the camera appears regardless of whether the VTR is playing back or recording.

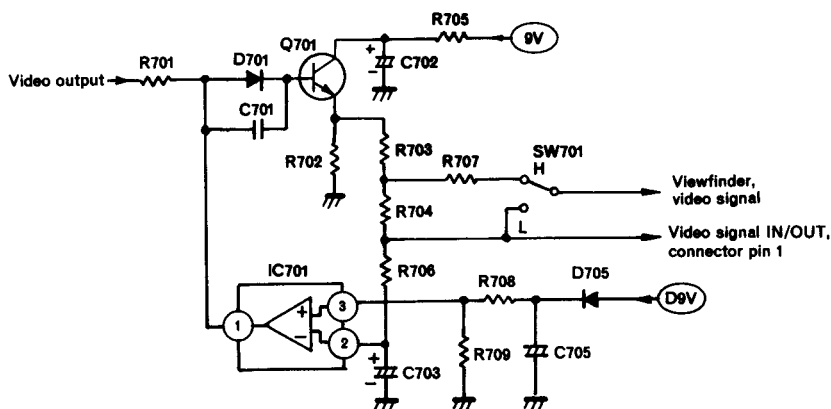


Fig. 3-33 Video select circuit

3-8 Power save circuit

This circuit supplies the signal to the VTR and sets the VTR to the power save mode when the power save switch

is set to "PWR SAVER"; DC9V is supplied to the return audio signal line via R1001.

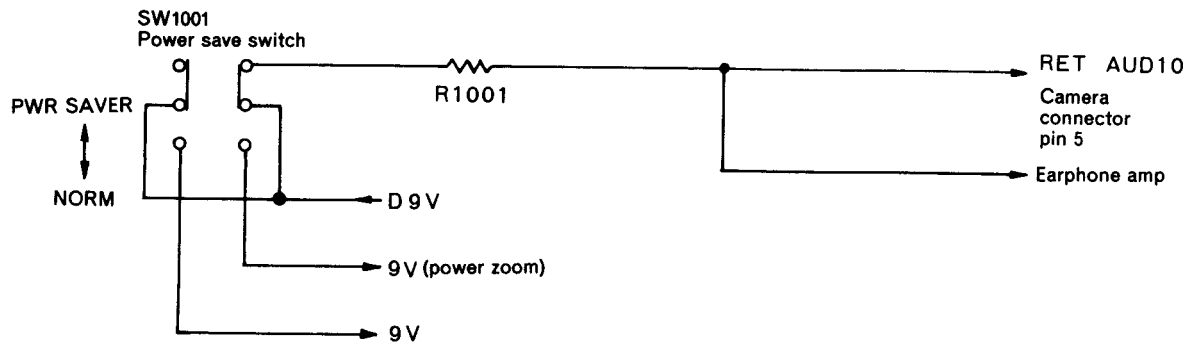


Fig. 3-34 Power save circuit diagram

3-9 Audio amplifier circuit

3-9-1 Microphone amplifier circuit

This is the circuit to amplify the audio signal from the microphone and supplies it to the VTR; IC601 performs

this. Overall amplification is approx. 45 dB, and the -20 dB output is obtained when a microphone (-65 dB) is used.

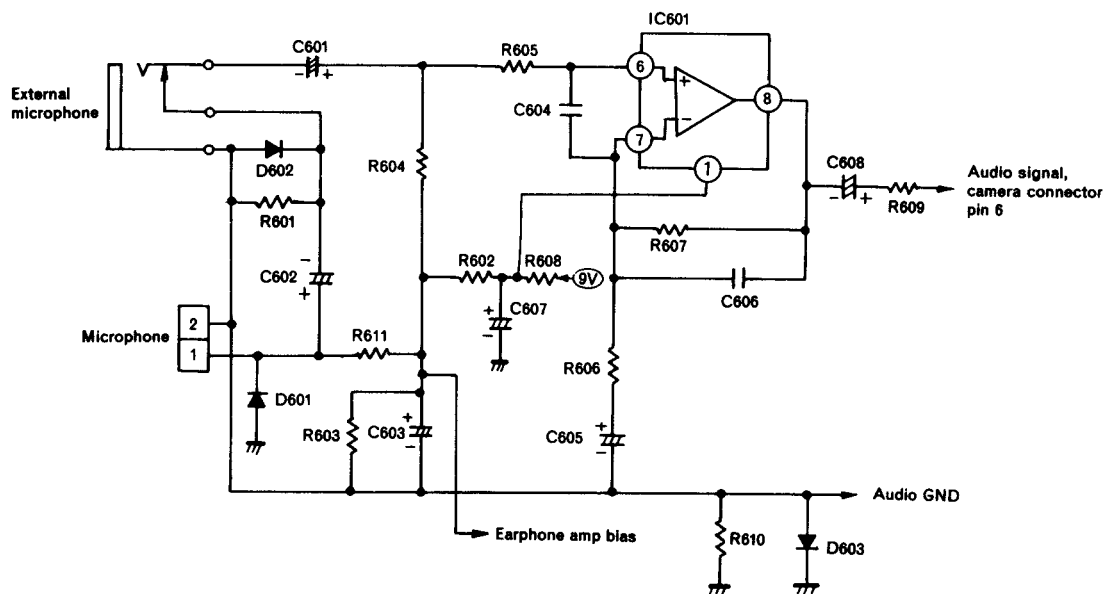


Fig. 3-35 Microphone amplifier circuit

3-9-2 Earphone amplifier circuit

This circuit is for monitoring the sound using an earphone while monitoring the return video signal using the viewfinder during VTR play.

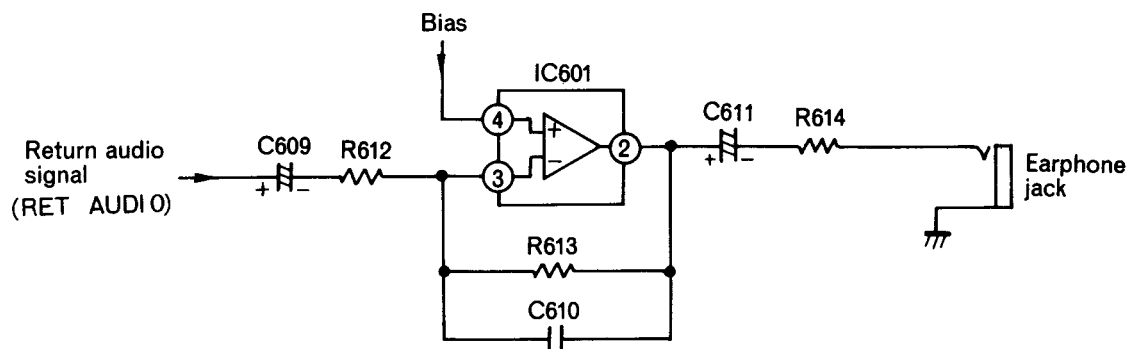


Fig. 3-36 Earphone amplifier circuit

3-10 Timing chart

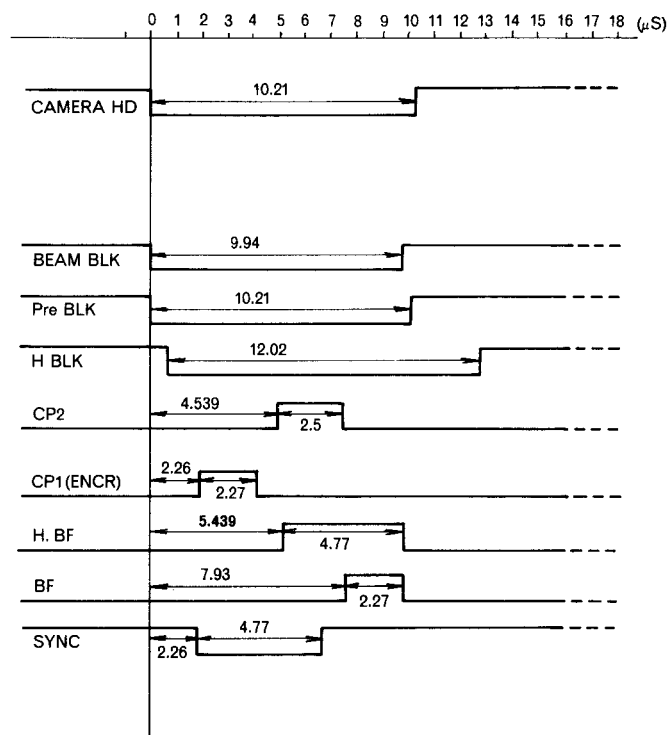


Fig. 3-37 Operation timing chart (H)

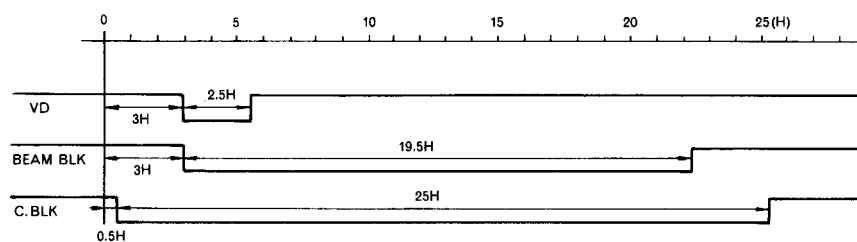


Fig. 3-38 Operation timing chart (V)

3-11 Viewfinder

1. The video amplifier circuit consisting of Q501 and Q502 amplifies the video signal output from the camera to drive the CRT.
2. IC501 incorporates the sync separation, AFC, horizontal oscillation, vertical oscillation, vertical excitation and vertical flyback blanking/generating circuits.
 - (1) The sync separation circuit separates the sync signal from the video signal to apply the sync signal to the vertical and horizontal oscillators and for synchronization.
 - (2) The AFC circuit converts the frequency error to the DC voltage to control the horizontal oscillation frequency.
 - (3) The horizontal oscillation circuit oscillate corresponding to the DC control voltage and generates the square wave pulse.
 - (4) The vertical oscillation circuit generates the sawtooth wave pulse to perform vertical deflection. This pulse is synchronized with the vertical sync pulse obtained by integrating the sync signal.
 - (5) The vertical excitation circuit amplifies the sawtooth wave and excites the vertical output.
 - (6) The vertical flyback line blanking/generating circuit generates the vertical flyback line blanking pulse to erase the flyback line. The flyback line blanking pulse is obtained by mixing the vertical flyback line blanking pulse and the horizontal output pulse.
3. The horizontal excitation circuit Q503 amplifies the horizontal oscillation pulse and excites the horizontal output.
4. The horizontal output circuit Q504 supplies the sawtooth current to the deflection yoke to scan the beam of the CRT in the horizontal direction, and boosts the pulse obtained at this time via the flyback transformer (FBT) to obtain the bias voltage of the CRT, heater voltage and the voltage of the video amplifier.
5. The vertical output circuit composed of Q505 and Q506 supplies the sawtooth current to the deflection yoke to scan the beam of the CRT in the vertical direction.

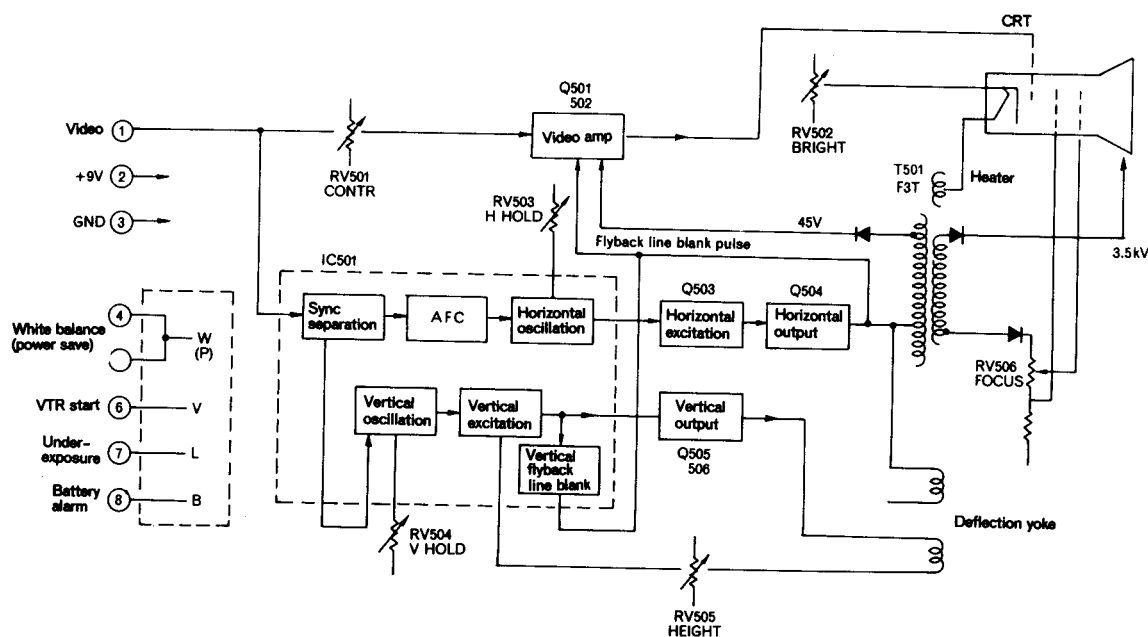


Fig. 3-39 Block diagram